IMPACTS OF CLIMATE CHANGE ON BEAVER RIVER FLOW IN WESTERN OKLAHOMA

By

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IMPACTS OF CLIMATE CHANGE ON BEAVER

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Abstract:

Development of technologies that use 85% of the world's fossil fuels and increasing demands and decreasing these resources have increased the production of CO_2 and thus climate change as well as rising global average temperature as 0.75° C, which causes natural disasters, such as droughts, floods and heat waves and can have negative impacts on the environment and economy.

So, review and assessment of climate change in future periods seems necessary for proper planning in the Beaver River catchment basin. Beaver River is located in northwestern Oklahoma, and continues to Canton Lake. In this study, using the output of HADCM3 general circulation models of the atmosphere under scenario A2, B1, A1B, hydraulic parameters, minimum and maximum temperatures will be forecasted in meteorological stations for future period of 2016-2045 and 2046 - 2075 using LARS-WG model. Then using IHACRES hydrologic model, after calibration and verification of model, runoff from precipitation and temperature for the next period of 2016-2045 and 2046 - 2075 was obtained in the hydrometric stations. The output of HADCM3 predicts the annual temperature and precipitation for future at the meteorological stations. The results show that climate change will affect the amount of annual runoff in hydrometric stations until the year 2075 and disrupts the runoff distribution during the months, so that the flow rate will be decreased.

Keywords: climate change, GCM models, downscaling, LARS-WG, Beaver River, IHACRES

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CHAPTER I

INTRODUCTION

Climate is the average climatic conditions for a specific area and a specific period. Climate change refers to changes in climate behavior of a region to the expected behavior which is observed and recorded from information over a long time horizon (Karamouz and Araghynejad 2005). Climate change is the significant statistical change in mean climate state that lasts for a long period (for decades or longer). This change could be in the average temperature, precipitation, weather patterns, wind, radiation and similar parameters.

The climate may be warmer or colder and annual values of precipitation may increase or decrease (Khalili, 2000). In general, the gradual rise in global and oceans temperatures, due to increase in greenhouse gases, is the most important factor in climate change. Global warming of the earth causes two important phenomenon in the last hundred years; increase of average global temperature and consequently increase in sea level. Moreover, climate change has had significant impacts on precipitation, evaporation, surface runoff and thus hydrological extreme events at regional and local scale (Karamouz and Araqinejad, 2005).

1.1 The effect of greenhouse gases on climate fluctuations

Studies show that in the presence of greenhouse gases, a larger part of the solar energy will be kept in land and this will increase the global temperature. According to available evidences, over the past 100 years, the earth's temperature has increased by 0.3-0.6° C, that this increase is proportional to the increase in greenhouse gases in the atmosphere. However, climatologists consider other factors affecting global warming and believe that just the effect of greenhouse gases is not responsible for warming the planet. (IPCC, 2007)

1.2 Introduction to Intergovernmental Panel on Climate Change IPCC

Climate change is a very complex process, so politicians and decision-makers in different countries need strong and reliable sources of information to determine the causes of climate change and economic, social and environmental issues as well as ways to reduce its impact and adaptability to it. That is why the United Nations, the World Meteorological Organization (WMO) and the United Nations Environment Program (UNEP) have established IPCC in 1988. The main center of IPCC is located in Switzerland (Geneva).

IPCC has an international scientific structure. The body of the organization consists of government representatives, experts and ordinary people. IPCC has 3 working groups as follows:

Working Group I: The science of climate change

Working Group II: Impacts of climate change, adaptation and vulnerability

Working Group III: reducing the effects of climate change

1.3 The effect of climate change on water resources

One of the very important issues that have recently attracted the attention of many researchers and managers of the water resources is the effects of climate change on water resources management. In the past (before 1990), the planning and management of water resources was based on the assumption that climatic conditions are the same in the past, present and future. While, it is now clear that climate condition is rapidly changing due to the growing trend of development and human activities such as the release of greenhouse gases into the atmosphere, destroying forests, agricultural development and so on. Therefore, it is necessary to consider the effect of these changes on the planning and management of water resources and managers should consider more serious approaches to engineering design criteria, operating rules and water allocation policies (Werritty, 2002). Studies show that the importance of climate change in developing countries where the population growth rate is higher and adaptation to climate change is less, is essential. (IPCC, 2007)

By implementation of atmospheric general circulation models (GCM's) and using approaches to produce climate data in different regions, it could be argued that higher temperatures lead to stronger water cycle. This shows the chance of increasing the occurrence of severe droughts or floods in some regions and reducing them in other regions. General circulation models often show an increase in the intensity of rain as a result of climate change. The result of this type of models, the intensification of heavy precipitation is such that runoff and flooding is increased and water infiltration capacity is reduced. Hydrological changes on the earth's surface also affects the groundwater discharge (in a relatively long time), that is, practically, the entire aquifer. These changes, in turn, can be affected by the changes in amount and timing of rainfall caused by climate change. These changes are summarized in table 1-1. (IPCC, 1997)

Table (1-1) effects of climate change on water resources (IPCC, 1997)

Factor	First Effect	Final Effect
CO2 Increase	photosynthesis increase, turbidity increase	increase in consuming effective water
temperature increase	increase in plant grows, increase in evapotranspiration, increase in lakes and reservoir evaporation, runoff reduction and reducing groundwater feeding	changes in amount of available water, more water demand for agriculture, cleaning and cooling off
water surface increase	coastal lands reduction, salt infiltration to coastal aquifer, water move to estuarine and its effects on sweet water reservoirs	water quality reduction in coastal land, water quality reduction in groundwater
change in seasonal rain	changes in soil moisture, change in river discharge, change in the groundwater feeding	changes in water amount and quality in reservoirs
change in temperature and rainfall location	changes in basin quantitative hydrology (local changes)	changes in locations for water storage
changes in rainfall fluctuation (daily or less than annually)	changes in water amount between two rainfall, changes in peak discharge	more need for water supply storage
changes in drought risks	change in amount of seasonal water or seasonal water replacement	changes in water storage risks possibility
changes in flood risks	change in flood risk possibility, change in environmental impacts	change in water storage risks possibility , change in reservoirs excavation

1.4. Necessity of research

Based on United States Environmental Protection Agency (EPA) Increases in average global temperatures are expected to be within the range of 0.3°C to 4.8°C by 2100. This will result in significant changes in water resources, energy demand, agricultural productivity and coastal areas. Changes in temperature pattern, reducing water resources, rising sea levels, destruction of coastal areas, loss of crops and food products, deforestation, drought frequency and resonance and direct threat to human health are the harmful effects of climate change. The indirect effects of climate change include economic damages caused by the developed countries countermeasures (NCCO, 2003).

One of the other reasons for this research is that the Beaver River and its streams are major sources of public-water supply in western Oklahoma. Optima Lake on the Beaver River near Hardesty, Fort Supply Lake on Wolf Creek near Fort Supply, and Canton Lake on the North Canadian River near Canton are the source of public-water supplies for Oklahoma panhandle and for the Oklahoma City municipal zone.

Therefore, this study introduces climate change and its effects on water resources by using the output of general circulation models in the catchment area of the Beaver River. Finally, we can expect the following questions to be answered:

Does a significant downward trend occur in meteorological and hydrological variables in the basin?

Does this trend continue in meteorological and hydrological variables in future periods?

Do the changes in meteorological and hydrological variables is due to climate change?

1.5 Research objectives

Due to climate change and its effects on water resources, the need to manage water resources will be highlighted more than ever. In this study, following objectives in Beaver River catchment area are investigated to introduce the phenomenon of climate change and its effects on water resources management:

- The regional review of climate change in the basin using Mann-Kendall statistical tests
- Introduction to the coupled atmosphere- ocean GCM models
- Evaluation of the results of GCM model,
- The use of LARS-WG to generate climatic data
- Analyzing the impact of climate change on the significant hydrometric stations of catchment basin using IHACRES hydrological model.

1.6 Methodology

Understanding the phenomenon of climate change, its effects on water resources and literature review was the first step in this research. Then, Beaver River basin was selected as a case study for this research. Next, using HADCM3 model, the outputs of GCM models under three climate scenarios A1B, B1, A2 was used to estimate minimum and maximum temperatures and precipitation in the future (2016-2045 and 2046-2075) using LARS-WG statistical downscaling model. Following, IHACRES hydrological model was calibrated and was used to calculate the runoff from predicted precipitation and temperature. Finally, the study was concluded.

1.7 Structure of the thesis

The structure of the thesis is as follows in the form of 7 chapters:

Chapter 1: in this chapter, while presenting an introductory to the causes and effects of the phenomenon of climate change on water resources, the necessity and purpose of the present study was mentioned.

Chapter 2: This chapter includes a review of studies done in all sections of this article which is presented in the form of 3 parts, the history of climate change impact assessment studies and general circulation climate models, records of research on downscaling models and the use of hydrological models to convert the precipitation data to runoff.

Chapter 3: In this chapter, research methods and tools are presented in the form of 6 sections, climate scenarios, GCM models, LARS-WG model, routing climate change using Mann-Kendall test and applying the IHACRES hydrological model to model the catchment basin and calibration of the model.

Chapter 4: This chapter provides the natural and climatic characteristics of Beaver River catchment basin. It also expresses the methodology.

Chapter 5: This chapter contains the results of research in the form of two small parts: temperature and precipitation data on a scale of station and converting the temperature and precipitation data to the rainfall. Also, the results are discussed in detail in this chapter.

Chapter 6: It includes the conclusions and future work.

At the end, a list of all the sources used in this research is given.

CHAPTER II

LITRATURE REVIEW

In recent years, climate change is studied by the scientific community worldwide as an important issue in 3 axes: scientific study of climate change, the consequences of climate change and adaptation and response to climate change. Review of the effects of climate change on water resources is among the issues which has seriously entered the climate change topic. To study the impacts of climate change on this event, it is necessary to conduct studies as follows

2.1 History of the studies on effects of climate change and atmospheric general circulation models

In short, until 1985, when the report of Scientific Committee of environmental issues was published regarding the climate change, water resources were not yet entered the issue of climate change. But at this time, various questions in hydrological society were raised regarding the techniques of reviewing water resources affected by global warming caused by the buildup of greenhouse gases. And also which hydrological model is available to examine the effects of climate and which one is more appropriate for regional studies.

In 1985, the World Meteorological Organization has reviewed the effects of climate changes on water resources, which include special offers for testing and validation of different methods. The topic was continued in 1987 with a brief review of sensitivity of water resources systems to 2 issues: climate change in the future and current fluctuations. In the same year, the International Association of Hydrological sciences (IAHS) has dedicated a part of the twenty-first general plan of International Union of Geodesy and Geophysics (IUGG) to the climate and water resources and has published a series of articles on this topic.

Intergovernmental Panel on Climate Change was established by the World Meteorological Organization and the United Nations Environment program in 1988. The main mission of the IPCC was to assess the risks of climate change.

Since 1990 to 2007, IPCC has published four series of assessment reports on climate change which are almost cited in all publications, conferences and seminars related to climate change.

Cohen (1986) has examined the problems of scenarios of temperature and precipitation in general climate models for changes in water levels of the Great Lakes of North America. As a result, it was predicted that the storage of pure water of the Great Lakes will be reduced in response to scientific changes. Although, these results were sensitive to changes in wind speed and other assumptions related to variables affecting the rate of lake evaporation, but with the use of temperature and precipitation in 2 global climate models called GISS and GFDL, it represents a 15 to 30% reduction in pure water storage of basin. Bultot et al., (1988) have studied the effect of doubling the concentration of carbon dioxide on hydrological factors such as potential evapotranspiration, soil moisture, snow pile, groundwater storages, runoff and water balance in Belgium in 3 catchment basins. The results of these studies were compared in normal mode for a period of 70 years and generally concluded that potential evapotranspiration will be increased and soil moisture reduced. The underground water reserves in basins with high permeability will be increased otherwise will be decreased. Also, in basins with low soil permeability, the amount of flooding will be increased in winter. Also, Mitchell (1989) has compared the studies of 5 different institutions. He conducted studies on the relationship between a doubling of CO2 and its effect on temperature and precipitation. As shown in Table 2-1, temperatures were predicted between 5.2 to 2.8° C and precipitation between 7 to 18%.

Table (2-1) study results of doubling CO2 and its effect on temperature and precipitation (Mitchell, 1989)

study center	Maximum temperature effects ° C	Maximum changes in rainfall (%)
GISS	4.2	11
GFOL	4	8.7
NCAR[1]	4	7.1
MO[2]	5.2	15
OSU[3]	2.8	7

In 2001, Kamga studied the impact of increasing greenhouse gases and climate change on Upper Benue River runoff in Cameroon where hydroelectric power is an important source of power

[1] National Center for Atmospheric Research
[2] Meteorological Office
[3] Oregon State University

generation to predict the discharge of the river. For this purpose, the monthly flow of river was estimated using a hydrological model of water level balance and the future course of climate change was simulated based on the ability of the model to reproduce the river current flow using HadCM2, ECHAM4 and OPYC3 models and concluded that due to the chosen scenario, an increase in temperature and precipitation in the region is expected. Jones et al., (2006) conducted a study on the sensitivity of annual average runoff in this area to climate change using SIMHYD and AWBM hydrological models in Australia catchment basins and found that the above models show the average changes of 2.1%, 2.5% and 2.4% to 1% change in the average precipitation. The efforts by Burger et al., (2007) on the effects of future climate change scenarios on runoff – precipitation modeling is another example of the efforts made in this field. Using regional climate change models, they simulated the Upper Gallego River discharge for A2 scenario in 2070-2100 with regard to future climate change.

They used two SVM[4] and RVM[5] learning machines to simulate the flow and concluded that the results of the RVM model are slightly more accurate than SVM. The estimation of runoff-precipitation transfer function from available time series also faces enormous complexity due to irregularities caused by human intervention. The model shows poor performance when the input data for climate models, such as precipitation, temperature and reservoir information are used, and use of data relating to previous trends is essential to better simulate (Tipping,2001).

Larson et al., (2008) estimated the cost of the risk of climate change in Alaska and their research duction more than 4 to 5 mm, especially in summer, and the only exception in this process, is an increase in winter rainfall in some northern basins of the Mediterranean, especially Alpine region. James et al., has shown that human-made systems in this area have left a lot of negative effects. Giorgi and Lionello (2008), reviewed the climate change in the Mediterranean coastal area and

[4] Support Vector Models
[5] Relevance Vector Machines

came to the conclusion that in this area, the major impact of climate change, is drought and precipitation re (2009) have examined the systems of adaptability to climate change in Canada and concluded that the right economic and social policies in the region in the long run can have a positive impact on the climate change management in the current and future situations.

2.2 Records of researches on downscaling models

Babaeian et al., (2004) assessed the climate change in South Korea from 2010 to 2049. In the study, the daily amounts of precipitation, radiation, maximum and minimum temperature for 10 synoptic stations in South Korea were generated for the period of 2010 - 2039 using LARS-WG model and researches on climate parameters such as precipitation, radiation, maximum and minimum temperatures, length of wet and dry days, hot and freezing days and heavy rainfall changes for the period of 2010 to 2039 was done. Khan et al., (2006) also examined the uncertainties in the downscaled results assessed the daily rainfall and daily maximum and minimum temperature of 3 downscaling methods. SDSM, LARS-WG models and artificial neural network. To evaluate the uncertainty for regional case study in Canada, they compared the mean and variance of downscaled values with observed data. Of course for precipitation data, in addition to examining the variance and mean values, they compared the monthly mean values of wet and dry periods and the cumulative distribution of monthly average daily rainfall data. The results of uncertainty assessment indicate that the SDSM model could better preserve the different statistical properties of the observed data than other models in downscaled quantities. Artificial neural network model was classified as the model with the weakest performance and LARS-WG was second. Among the latest efforts in this field, studies by Chiew et al (2010) can be mentioned who used downscaling methods to simulate the runoff from rainfall in the Murray River in South Australia, in which five daily downscaling models, analog method, NHMM and CLIM statistical models and CCAM dynamic methods were used and the results of all these models indicate reduced rainfall and runoff in this region.

Fedderson and Anderson (2005) reduced the scale of monthly values of meteorological variables in North America. Information obtained by this method was controlled by using the ground station observations that collect data on a daily basis. Input information is derived from the results of general circulation models (GCM). These results are provided in 3 modeling steps including reducing spatial scale of data using SVD statistical methods, matching the data of the desired area and then estimation and comparison of the results using the daily information. They increased the accuracy of this method compared with the dynamic downscaling method.

Schmidi (2006) studied the possibility of downscaling using the results of general circulation models of the atmosphere. They developed their method through the reanalyzed data of NCEP and ECMWF scenarios. This method also developed the daily estimation of monthly information. Tripathi et al., (2006) provided a method based on the use of statistical machine learning methods (SVM) and the results of GCM to downscale the climate information and modeling of rainfall in a monthly time scale. At first, information of second-generation models of SGCM-2 was prepared in an area that includes regional studies, and then was applied for future estimations. The used information was collected in 36 points of NCEP database that includes temperature and pressure at different height levels, particularly relative humidity and wind speed factors. To evaluate their models, they used feed forward neural networks and ultimately SVM method was considered to be more efficient. Anandhi et al., (2009) also downscaled the monthly maximum and minimum temperature in the basin area using statistical methods. To provide input information, the NCEP/NCAR database and third-generation Canadian Information Centre for International Climate Reviews (CGCM3) over 1978-2000 and 1978-2100 have been used. Input parameters are classified in 3 classes of large-scale climatic parameters; the parameters of the surface flux and the sum of two above classes, which each formed the input set of a model. The modeling and the effect of these parameters on support vector machine model are the results of this research.

WuDi et al., (2010) assessed and simulated climate change over 2011 - 2025 in 5 provinces in southwest China using RegCM3 simulation model and output of two general circulation model of the atmosphere - ocean ECHAM5 and taking into account the emission scenario SRES A1B. The results showed that temperature changes in North is more than South and min and max temperature change in winter is more than summer. Their research also showed that annual rainfall has increased while precipitation in summer and spring has been reduced.

Tolika et al., (2007), used the artificial neural networks to downscale the precipitation at some stations of Greece on seasonal time scale (winter and spring). Using large-scale reanalyzed signals in the NCEP / NCAR Bank, they recommend their statistical approach. The input data used in both classes include large-scale information at the level of 500 mbar as well as rainfall and moisture level information. Results indicate good accuracy in two seasons and one of the reasons for the accuracy was using the second class information in modelling process. The applied information has spatial accuracy 2.5*2.5 ° between 1958 and 2000. The model outputs were assessed using data recorded on 25 land measuring station. Liu et al., (2008), also predicted the daily temperature and precipitation in the Chute-Diabelo basin in northeastern Canada with the use of artificial neural networks. Information was prepared from a 200*200 km network of MRF model. He also used linear and polynomial regression methods and considered the artificial neural networks and polynomial more efficient than the traditional statistical (linear) method.

2.3 Application of hydrological models for basin modeling

Since 1987, the World Meteorological Organization (WMO) has emphasized the need for research on the effects of climate change on water resources. Accordingly, one part of eleventh meeting of the International Union of Geodesy and Geophysics by the International Association of Hydrological Sciences was allocated to the climate and water resources. Also the meeting on potential problems of climate change on water resources was held in Australia in 1988. The above factors led to extensive research by scientists to find hydrological answers of climate change in catchment basins and its impacts on water resources which investigations have continued since then.

Among the research done in this area, we can refer to research by Mirza (2001). To examine the effects of global warming and climate change on the probability of flooding at the junction of three rivers; Gang, Brahmaputra and Mogh in Bangladesh, he used the outputs of four general circulation models. Hi entered the result of these models' output as input to the GIS-11 Mike hydrological model.

His research results showed that in the event of climate change, peak discharge will be increased at the junction of the three rivers and these changes may result in flooding.

Matondo et al., (2004), examined the effects of climate change on hydrology and water resources in Switzerland and to study the effects of climate change, they used GCM model outputs. The assessment was done on three basins namely Mbuluzi, Komati and Ngwavuma. To produce downscaled data in the base period, they used MAGICC model. Then, the climate variables were introduced as inputs to a calibrated rainfall - runoff model called WatBall. The results showed that the runoff will not change in Mbuluzi and komati basins, but the annual runoff in Angavama basin will change from 4% to 23%. Andersen et al., (2006), studied the impact of climate change on hydrology and water resources in Gjern River basin in Denmark using the general circulation model ECHAM4 under Scenario A2 in the period from 2071 to 2100. In their investigation, they used the Trans 11 Mike hydrodynamic model and statistical models and selected the period of 1961-1990 as the base period. In this review, six basins with an area of about 4 to 40 square kilometers were discussed and evaluated. The results indicate an increase in annual average temperatures and precipitation. Also in this study, to evaluate the effect of climate change on water resources of the studied basin, a rainfall - runoff model called NAM was used. The results obtained from the use of this model has shown that the average winter runoff will be increased as 7.5%, while summer runoff in the basin with loamy soil will be reduced by 40 to 70%.

Maurer et al., (2007), used the statistical methods for downscaling the outputs of 16 general circulation models under two scenarios A2 and B2 to evaluate the effects of climate change on water inlet of two large hydroelectric reservoirs in the Rio Lampa catchment basin in Central America. They then introduced the downscaled values of temperature and precipitation as VIC hydrological model. The results showed that under both scenarios, up to the end of the century, average temperature and average rainfall will be decreased. Accordingly, they concluded that the entrance to the reservoir and consequently, the hydroelectric production capacity of reservoirs will also decline.

Akhtar et al., (2008) studied the impact of climate change on water resources in Hindukush-karakorum basin located in the Himalayas for 2071-2100 periods and used the regional climate model PRECIS RCM under the A2 emission scenario. To obtain the river discharge in the coming period, they applied HBV-MET and HBV-PRECIS models. Their results showed that in the catchment area, precipitation and temperature will increase until the end of 21st century. As a result, the amount of runoff and the intensity of floods will be also affected by climate change and it will increase.

Noora et al., (2010) in their study, assessed the impact of climate change on flooding in Finland. To this end, they used the average output of 19 general circulation climate models (GCM) under 3 emission scenarios B1, A2 and A1B and 4 local climate models (RCM) with A1B emission scenarios. All climatic scenarios were used for the period of 2010-2039 and 2070-2099 and observation period 1971-2000. The results show the annual temperature increase between 1.8 and 5.4 C for 2070-2099 and increased precipitation between 8% and 22%. Finally, WSFS hydrological model was used to study the effects of climate change on flooding that in this model, daily precipitation and temperature obtained from climate models were entered as inputs to the model. They concluded that the floods with a return period of 100 years had an average reduction of 8 to 22% in the period 2070-2099 compared to the reference period.

MG Grillakis et al., (2011) assessed the impact of climate change on the hydrological future of Spencer Greeck catchment basin located in Canada based on the A2 emission scenario and climate model (NARCCAP) in the period 2040 to 2069 and to obtain the runoff of the desired catchment, entered the climate model results as input to 3 hydrological model SAC-SMA, HEC-HMS and IHMS-HBV. The results show increase in the average amount of runoff and a significant change in seasonal runoff distribution. Changes in runoff seasonal distribution are due to the increased temperature in the spring and winter and as a result, the snow is early melted.

In addition to climate change, human activities also affects the hydrological cycle of water in the basin.

M. Kopytkovskiy et al., (2014) assessed the impact of climate change on water resources and reservoir levels on the Upper Colorado River Basin (UCRB) located in Colorado, America. They used A2 and B1 scenarios by applying general circulation models (GCM) and bias-corrected constructed analogues (BCCA) downscaling model for 2046-2065 and 2081-2100 periods.

They conducted that under A2 scenario streamflow is increasing in winter month but runoff is decreasing in summer and spring months. Precipitation alters in different elevations, 60% decline in precipitation at low elevation and 74% increase in high elevation. Also temperature will increase yearly that leads to more evaporation and less soil moisture.

CHAPTER III

METHODOLOGY

In this chapter, research tools are expressed in 6 sections and each section discusses how to use these tools in detail. Classification of this chapter is as follows:

- Climate scenario
- GCM models
- Downscaling
- The introduction of LARS-WG
- Routing climate change using the Mann-Kendall statistical tests
- The introduction to IHACRES model

3.1Climatic scenarios in future periods

The variation in the concentration of greenhouse gases in the atmosphere over time disturbs the balance between earth's climate system components. But the amount of gas entering the system in the future and the scenario that will consequently occur for system is uncertain. So, it is presented as quite definite and under two different scenarios, which include non-climatic and climatic scenarios.

Non-climatic scenario

Several factors can lead to pollution and change in natural condition in the environment and affect the environment. Among which we can refer to society economic activities and subsequently, growth in industries and factories as well as changes in land use, leading to many contaminations and change in natural conditions in the environment. All of which increase concentrations of greenhouse gases. Therefore, it is necessary to examine the socioeconomic status of the earth in future periods. Generally, a non-climatic status contains information on the socio-economic situation and the amount of greenhouse gases emission in the earth's atmosphere, which is also called Emission Scenario.

Intergovernmental Panel on Climate Change is in charge of understanding all aspects of climate change and provided the initial set of emissions scenarios in 1992 called Scenari (IS92a-IS92f).

In this scenario, the amounts of greenhouse gases were increased at a fixed rate by 2100. In 1996, IPCC published a new series of emission scenarios to update and replace the IS92 scenarios called SRES[6]. In total, 40 different sub-scenarios SRES which includes a wide range of changes in the growth of the human population in future, economic and technological factors affecting on greenhouse gas emissions and particulate matter is provided. Each of the following scenarios is related to one of the A1, A2, B1 and B2 groups.

[6] Special Report on Emission Scenarios

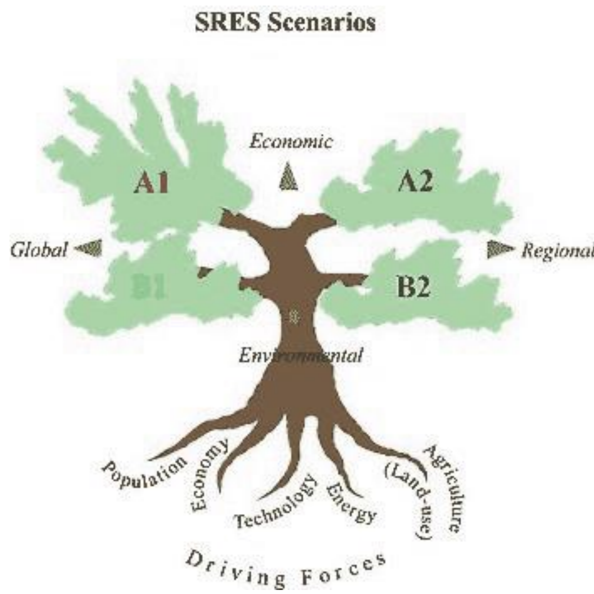


Figure (3-1) status of four SRES families (IPCC, 2007)

A1: This scenario is formulated assuming the very rapid global economic development.

Assumptions in this scenario are as follows:

- The world population reaches its maximum in the mid-21st century and then declines.
- New technologies are rapidly developed with higher efficiency.
- Political, social and cultural development is capacitated to join different regions, and the development of cultural and social communication leads in reduces per capita income difference in different regions.
- This scenario has three sub-scenario, showing possible orientations in the field of energy use efficiency in the developing technologies:

A1F1: focus on the use of fossil fuels

A1T: focus on the use of non-fossil fuels

A1B: balance between the use of fossil and non-fossil fuels

A2: This scenario is formulated assuming a heterogeneous world. Assumptions in this scenario are as follows:

- Focus on self-reliance and preservation of local entities.
- Population development patterns converge with a pretty slow process that led to the consistent growth of population.
- Economic development and per capita economic growth and technological development will be very different and slower than other listed processes in different regions.

B1: The scenario is formulated assuming a homogeneous world. Assumptions in this scenario are as follows:

- World's population in this scenario reaches its maximum in the half of twenty-first century and then gradually decline. Population growth in this scenario is similar to scenario A1.
- Economic structures change rapidly to provide information and services and use of raw materials will be reduced.
- Clean technologies are rapidly developed in this option.
- Emphasis in this scenario is on providing global solutions for sustainable development in economic, social and environmental fields and development of equality and social justice without performance of most incentives related to studies of climate change.

B2: In this scenario, it is assumed that local solutions are addressed for achieving sustainable development in economic, social and environmental fields. Assumptions in this scenario are as follows:

- Population growth will be continued constantly but at a rate lower than A2 scenario.
- Economic growth is considered for economic development.
- The slower but more diverse technological development than the scenarios A1 and B1
- However, in this scenario, orientations are towards environmental protection and social equality, but focus is more on local and regional solutions.

It should be noted that these scenarios are similar to those used in the third series of IPCC reports and in none of them the impact of the United Nation activities, IPCC and other organizations in the field of curbing climate change process is not taken into account.

Climatic Scenario

According to what was said, scientists are greatly ensured to the increase in concentrations of atmospheric gases and thus increasing the average surface temperature of earth's atmosphere in future periods. But the changes in climatic variables on regional scale are not explicitly specified. Therefore, due to the difficulties in forecasting regional climate status under climate change is considered as an alternative to possible future climate conditions. But the remarkable thing is that the climate condition is not a predictor of the weather. (IPCC-TGCIA, 1999)

Currently, different methods for the production of climatic conditions in the coming period are being used which most elementary is production of synthetic scenarios in which climate variables increase or decrease arbitrarily (Williams et al., 1995, Semenov & Porter, 1988). For example, a certain percentage of rainfall can be reduced and temperature increased. Different climatic conditions are easy to produce. Lack of acceptability of results is due to lack of physical basis in the scenarios.

Other methods of producing climatic conditions include the use of past data of the studied region climate variable. In this way, if the process of the desired variable is observed, the process is elongated with the use of statistical methods and the variable is simulated for future periods (Yu et al., 2002). The major weakness of this method is relying on the experienced process of past data.

Research shows that the trends observed in regional statistical periods can be part of long-term cycles of internal changes of region climate system (Zhang et al., 1997). So continuance of the process for future periods indicates that the status of that variable is not necessarily affected by climate change.

Now, the most reliable tools to produce climate scenarios are coupled three-dimensional models of ocean – atmosphere, general circulation model (GCM) (Wilby & Harris, 2005).

3.2 General circulation models

Today, the study of the effects of greenhouse gases becomes a scientific and political issue. This leads to increasing pressure to provide different scenarios for recognizing the climate and factors affecting it. Climate scenarios don't predict the future, but it can be defined that the climatic scenarios are a general picture of possible future for the climate.

General circulations models are three-dimensional ones which are developed based on different climate scenarios to simulate the effect of greenhouse gases on the earth's climate and are able to predict earth's future climate change (XU, 1999). The models were first introduced and applied in the 60s based on personal research of Phillips. General circulation models of the atmosphere solve continuum of fluid dynamics equations in atmosphere at discrete spatial and temporal scales. The structure of the models and numerical weather prediction models are identical. The major difference between these models is that weather predictions are accurately implemented in a short period (in a few days) with the definition of initial conditions, and their precision is in the region with dimensions of less than 150 square kilometers. However, the network defined for GCMs includes some latitude and longitudes which can be used for weather long term simulation which is often equal with climate change.

General circulation models provide the best information on climate change due to greenhouse gas increase. These models are time dependent and have three-dimensional numerical simulations including atmospheric motions, heat exchanges and interactions of ice, ocean and land (Dracup & Vicuna, 2005). The equations used in GCM models are divided into two main categories: energy and momentum exchange equations, and conservation of mass and water vapor. To use GCM models, the atmosphere is divided into a network of volumetric elements as shown in Figure 2-3, and is then solved in each the following equations:

- Energy conservation equation: According to this equation, the force is equal to the increase in internal energy plus the done work.
- Conservation of momentum equation: According to this equation, force is the product of mass per acceleration.
- Conservation of mass equation: This equation states that the sum of density multiplied in wind speed (equals mass) in all three dimensions is zero.
- Full gas law equation: According to this principle, the product of pressure in the volume is equal to gas constant at the absolute temperature.
- The above equations are solved in the time aspect for different time steps.

Due to computational limitations, analyzes related to predicting the general climate is done by limited centers equipped with short supercomputer of these calculations. Currently, more than 40 different organizations worldwide developed the general circulation models for earth. Some of the most famous ones and the general circulation models developed by them are as follows (IPCC, 2007):

- HadCM2, HadCm3 models in UKMHC[7] in United Kingdom
- GFDL[8]model in America
- PCM1 model in The National Center of Atmospheric Research in America
- CGCM1,CGCM2, CGCM3 models in CCCMA[9] in Canada
- CSIRO-MK2 model in CSIRO[10] in Australia

General circulation models are applied in two main fields: numerical weather forecasting and climate simulations:

1. Numerical weather forecasting: in this mode, general circulation models are applied for one or next twenty days. Latest information on atmosphere is considered as program start value. The purpose of this model is determining the amount of climate in listed horizons.

2. Climate simulations: in this mode, general circulation models are implemented for horizons of a season to several centuries and its initial conditions can be average weather conditions in a region (that is described as climate). The purpose by running these models is statistical forecast of climate change as well as climate conditions prediction in conditions that significant changes may occur in one of the climatic factors (such as an abnormal increase in temperature).

[7] United kingdom Met Office Hadley Center
[8] Geophysical Fluids Dynamics Laboratory
[9]Canadian Center for Climate Modeling and Analysis
[10] Australia's Commonwealth Scientific and Industrial Research Organization

The main and general results of general circulation model outputs that all emphasize them are as follows:

- Earth getting warmer than ocean in winter
- Slight warming of the Arctic in the summer
- Slight seasonal changes and warming in low-latitude and Southern Ocean
- Reducing the periodical temperature of land in most seasons and regions of the world
- Abnormal increase in maximum temperature and abnormal decrease in minimum temperature
- Rainfall increase in high latitudes in winter
- Increasing the possibility in the intensity of rainfall in many parts of the world

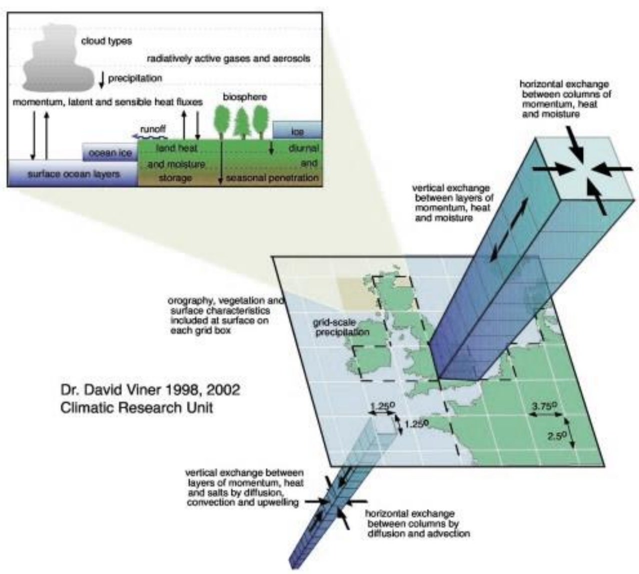


Figure (3-2) Structure of General Circulation Models

Data available from AOGCM[11] models

In 1998, IPCC created a committee to collect the output of AOGCM models called DDC [11] (IPCC-DDC, 1998). One of the main goals of this center is collecting outputs of AOGCM models to use in research on climate change. DDC imposed the following criteria to accept the output of AOGCM models:

Models implemented IS92a scenario in addition to other emission scenarios.

(IS92a scenario is the continuum of the observed trend in the current data for the future.)

- Implementation of models based on atmosphere gases recorded data in the last century
- Implementation of models based on different scenarios until 2100
- Models being scientifically documented scientific
- Models which have been tested in comparative plans of AOGCM such as AMIP[12] and CMIP[13] (Gates et al., 1998).

After checking the AOGCM models with the listed criteria, the output of the models have passed different scenarios in DDC sector of the IPCC. CCSR model from Japan Climatic Research Center, CGCM model from the center of analysis and modeling of climate in Canada, GSIRO-MK2 model from Australia Scientific and Industrial Research Center, ECHAM4 model from Germany Research Center, GFDL-R from America geophysics fluid dynamics laboratory, HadCM3 model from Hadley climate prediction and research center in England and NCAR-DOE PCM model from America atmospheric research center. Table 3-1 shows the characteristics of these models (IPCC-TGCIA, 1999).

[11] Atmosphere-Ocean General Circulation Models
[12] Data Distribution Center
[13] Intercomparison Project Atmospheric Model
[14] The Coupled Models Atmospheric Model

In all the models, eight climatic variables of earth's surface including rainfall, sea level pressure, solar radiation, average air temperature, dew point temperature, minimum temperature, maximum temperature and wind speed at a height of 10 meters by the year 2100 have been simulated under different emission scenarios. Also, other factors, including daily temperature change range, the vapor pressure, the variance of daily temperature and rainfall are also run under some models. Complete sets of monthly variables listed in the archive of AOGCM model data are available in the DDC section of IPCC website (IPCC-DDC, 1988).

Table 3-1 AOGCM models characteristics available in DDC (IPCC-TGCIA, 1999)

	ECHAM4	HadCM3	CSIRO	CGCM2	GFDL-R30	NCAR	CCSR
location precision ,AOGCM(Degree), (length* width)	2.8*2.8	2.5*3.75	3.2*5.6	3.7*3.7	4.5*7.5	4.5*7.5	5.6*5.6
Green House Gases Simulation Period & Suspended Particles in the past	CO_2: 1960-1989 SO_4:1860-1989	CO_2: 1860-1989 SO_4: 1860-1989	CO_2: 1881-1989 SO_4: 1860-1989	CO_2: 1900-1989 SO_4: 1860-1989	CO_2: 1766-1989 SO_4: 1901-1989	CO_2: 1901-1989 SO_4: 1901-1989	CO_2: 1890-1989 SO_4: 1890-1989
Duration of Simulation Period (year)	control period: 240 SRES Scenario: 1990-2000	control period: 240 SRES scenario: 1950-2099	control period: 219 SRES scenario: 1961-2100	control period: 200 SRES scenario: 1900-2100	control period: 1000 SRES scenario: 1961-2100	control period: 136 SRES scenario: 1980-2099	control period: 210 SRES scenario : 1890-2100
Simulated Scenarios SRES	A2,B2	A2,A2b,A2c ,B1	A1,A2,B1, B2	A2,B2	A2,B2	A2,B2,A1 B	A1,FI,A 1T,A2,B 1,B2
Reference	Stendel et al, 2000	Gordon et al., 2000	Gordon and O'Farrell, 1997	Flato and Boer, 2001	Knuton et al., 1999	Mcchl et al., 2001	Nozawa et al., 2001

3.3 Downscaling

Identification and study of the effects of greenhouse gases requires the use of climate scenarios with high temporal resolution at a daily limit or less than daily. However, converting GCM model scales from earth to local scale and converting them from annual and monthly and smaller, reduces the validity and reliability of these models. A GCM model also might be well able to produce variables such as average monthly or seasonal temperature. However, this model with a much less quality is capable of producing variables such as daily temperature or more accurate statistics such as standard deviation of daily temperature.

One of the main constraints in using the climatic outputs of general circulation models is that the accuracy of their spatial and temporal analysis is not consistent with required accuracy for regional and hydrological models. Spatial precision of these models is about 200 km. This accuracy is not proper especially for examining mountainous regions and climatic factors such as rainfall and temperature (Wibly & Dettinger, 2000). Using downscaling method, the output of these models can be converted to the surface variables in basin scale. Downscaling is in fact the process of moving from large scale predictors to local scale predictors. Various methods exist to produce regional climate scenarios from climatic scenarios of atmospheric general circulation models that include:

1. Use of the original cell information:

In this method, the climatic variables simulated by the general circulation are extracted from information related to the cell that studied area (station) is located in it. This method has no enough accuracy, because of the large computational networks and lack of consistency of their size and dimensions of the catchment area (Wibly & Harris, 2006).

2. Interpolation of adjacent cell information:

To overcome the lack of continuity between climatic variable changes simulated in close sites which are placed in two different computational cells, the interpolation method in adjacent cells in the study area is used. (Barrow et al., 1996) An important question in this way is the number of cells required around the main cell for interpolation calculations. The investigation has shown that for interpolation calculation, information of at least 4 cells around the original cell is required. (Von Storch et al., 1993)

3. Statistical downscaling methods:

More logical method to increase the resolution of general circulation model outputs is calculating the observed changes in studied surface variables at the regional scale as a function of the statistical properties of the large-scale observed variables. In the method, after determining the optimal function, large-scale climate variables, which are simulated by general circulation models in future periods, are applied as input variable in this function is applied and the surface variable will be obtained. Although this method provides better results than previous ones, a lot of observed data and expert judgment are required to establish the proper relationship (Wibly et al., 1998).

4. Dynamic methods:

Dynamic methods include explicit solution of systems based on physical – dynamical processes. In these methods, the models are used which are theoretical like general circulation models of the atmosphere. The main difference of these models with large-scale models of the general circulation of the atmosphere is that these models are used in more limited scale and with higher precision. It is obvious that in addition to the equations ruling over general circulation models of the atmosphere, the outputs of large-scale models and future climate scenarios are considered as the boundary conditions of these models (Christensen et al., 2004).

Comparison of the dynamical and statistical methods of downscaling

Downscaling method is in fact the bridge between large-scale cycles (predictors) and local meteorological variables (predicted). What is more considered in this way than anything else, is moving from the large-scale predictors to the local scale predicted ones. From among the above methods, there are two main ways: dynamic and statistical downscaling methods. In the dynamic method, regional cycle model is used for GCM outputs as boundary conditions. One of the main assumptions in the statistical method is that an empirical relationship is established between the different climate processes in different spatial and temporal scales. This relationship is dependent on the predictor variables, choosing one of them is the main objective in this model. In Table 3-2, main advantages and disadvantages of dynamical and statistical downscaling methods are presented (Wibly et al., 1998).

Table (3-2) main downscaling advantageous and disadvantageous with statistical and dynamic methods (Wilby et al, 1998)

	Statistical method	Dynamic method
Advantageous	• Produce climatic information in station scale from outputs in GCM scale • Cheap, no need to tough calculation capable of easy transition • Ensemble production from climate scenarios regarding to risk analysis and uncertainty	• Climatic information with 10-50 kilometer resolution from outputs in GCM scale • Responsive to atmospheric processes • Coordination with GCM
Disadvantages	• Dependent to GCM situation • Choosing basin scale and position impacts final results • Information with suitable quality is required to calibrate the model • Predictor and predictable correlation is usually changeable • Choosing predictor indexes impacts the results	• Dependent to real GCM situation • Choosing basin scale and position impacts final results • Major calculation resources is required • Ensemble series from climatic scenarios will not be created • First position impacts the final results • Clouds transfer method impacts the (rainfall) results • Transfer it to new location or area is not easy • Usually it is used separately from center computers so its results it is not usable for recommended changes to GCM is not

In Figure 3-3, the downscaling process of GCM predictors to meteorological local variables in two dynamic and statistical methods is shown.

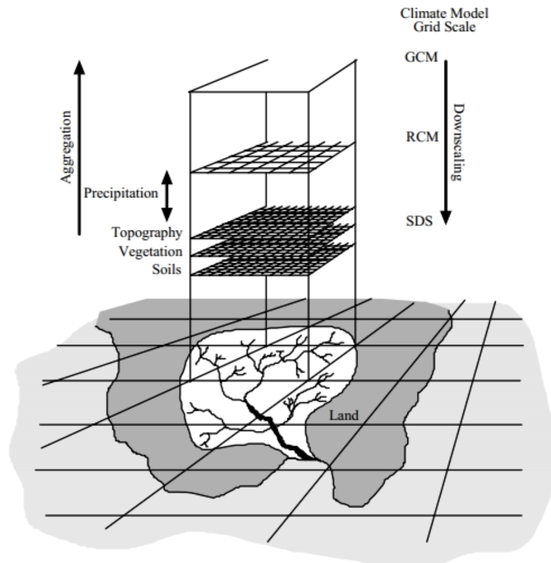


Figure 3-3 schematic approaches to climatic models downscaling. (Wilby & Dawson, 2004)

Although both methods have sufficient capability to estimate the surface variables through climate conditions, but according to advantages of statistical methods like generating various prediction scenarios and results' probability function, it is used in the present study.

3.4 Introduction to LARS-WG model

The basic version of LARS-WG[14] was invented in Budapest in 1990 as part of the agricultural risk assessment project in Hungary. In artificial generator models of meteorological parameters, mainly two statistical methods are used, Markov chains (type Richardson) and semi-empirical distribution (type Zemnov).

LARS-WG is one of the most popular models of weather random data generator which uses semi-empirical distribution to generate daily precipitation, radiation and the maximum and minimum daily temperature at a station, under the present and future climate conditions. LARS-WG uses a

[14] LARS-WG: Long Ashton Research Station Weather Generator

complex statistical distribution for weather variables modeling. The model uses the following semi-empirical distribution for the length of wet and dry days, daily precipitation and radiation:

$$EMP = \{a_o, a_i, h_i; i = 1,2, \dots ,10\} \tag{1-3}$$

Where, EMP is a histogram with ten efficiency and intensity of precipitation events: $a_{i-1} < a_i$,$[a_{i-1}, a_i)$ and h_i shows the number of precipitation in (i_x) distance. The random values are determined by semi-empirical distribution by selecting one of distances and then selecting a value in the range of event distribution. This type of distribution is flexible and can be partly converted into a wide variety of forms with different yields$[a_{i-1}, a_i)$. The$[a_{i-1}, a_i)$ distance is based on the expected distribution of meteorological variables behavior. Distances between maximum and minimum values of monthly observed data are equal for solar radiation, whereas for rainfall and wet and dry series, distances increase gradually by increasing the i. In these two cases, small amounts typically exist in large numbers and large numbers in small amounts. This way of choosing distance prevents the use of a low accuracy for small intervals.

3.4.1 Performance of LARS-WG for downscaling

The new version of LARS-WG combines the results of 15 GCM models used in the IPCC AR4 (Solomon et al., 2007). The key features of GCM models include grid precision, available SRES emission scenarios and the reference period for climate predictions for each scenario. For example, the dimensions of grid used for HADCM3 climate models which are used in this thesis to build information is 2.5 to 3.75 For most GCMs in AR4, climatic predictions are available for SRES emission scenarios (SRA2,SRA1B, SRB1). All these GCMs are coupled ocean-atmosphere models and most of them have been implemented for the period 1960-2100. In the LARS-WG, the output of GCMs is available as monthly average of climatic variables, including rainfall, maximum and minimum temperatures and radiation.

GCM spatial aspects being large-scale cause significant errors and major uncertainties in their outputs, particularly for rainfall at the local scale. These errors arise because many small-scale processes cannot enter explicitly in climate models and must somehow be estimated. This problem is due to limitations in computing power, limitation in our understanding of a downscaling processes and lack of accurate observational data for validation. To overcome this problem, different downscaling techniques have been developed which include dynamical downscaling by regional climate models, and statistical downscaling, as well as WG weather data generating models.

This model uses the daily observational data at a specific site to calculate a class of possible distribution parameters of climatic variables, as well as the correlation between them. This category of parameters is used to build a synthetic time series of climate variables. By setting the obtained distribution parameters, a daily climate scenario for the site is created based on projected climate changes obtained from regional or global climate models, that can be used to assess climate changes and generating information (Semenov & Stratonovic, 2010)

To generate the climate scenarios in a site, for example, between 2011-2030 and emission scenario SRA1B, the parameters derived from observed data are set by Δ changes in 2011-2030, based on SRA1B scenario that Δ changes are predicted by GCM for each of the climatic variables for a grid covering the desired site cover. Monthly forecast exists for each GCM for maximum and minimum temperature (or only mean temperature for some GCMs) precipitation and radiation for emissions scenarios SRA1B, SRA2, SRB1 and reference periods, the years 2011-2030, 2046-2065 and 2081-2100. Changes of Δ are calculated as relative changes for precipitation and radiation and absolute changes for maximum and minimum temperature (Semonov & Stratonovic, 2010). In other words, in LARS-WG model, atmospheric large-scale variables are not directly used, rather the climatic variables of local station are determined based on relative or monthly absolute changes in average daily rainfall amounts, wet and dry periods, standard deviation and mean daily temperature between the present and future values which are predicted by a GCM, that shows the climate change in the region.

3.4.2 How to calibrate the model

To calibrate the model, it is required to create two text files with DAT and ST suffixes to analyze the observational data of the desired station. DAT file contains all daily observed information and ST includes the name, latitude, longitude, altitude, DAT file address in the computer drive and the column data defined in the DAT file.

Observational data with any time length can be used to calibrate the model, but for better answer, at least 10 year data must be available and in areas with changing climate, more length is needed. If modeling events is with high-intensity and low probability of occurrence, the data with the maximum length of time should be used during calibration.

3.4.3 How to evaluate the performance of the model

When LARS-WG was calibrated using observed data, the next step is to determine the performance of the model. In other words, assessment of ability of the model in simulating the climate in the desired station to determine whether the results are appropriate for use or not? .This can be done in two ways: 1) generating data using GENERATOR option based on information from the site parameter file and then comparing the observed and fabricated data manually, 2) using Qtest option. LARS-WG made the efficiency of model in simulation of observed condition simple by presenting Qtest options. At this stage, the statistical properties of observed data are compared with the characteristics of synthetic data based on parameters derived from observed data. Two statistical tests including Kolmogorov - Smirnov and t-test are applied to determine whether the statistical distribution and average dummy data have a huge difference to the statistical properties of observed data or not. Statistical tests performed at the Qtest are due to differences between the simulated climate and real one.

3.4.4 Kolmogorov - Smirnov Test

This is a non-parametric test. The test is able to do accurate inferences when the basic assumptions (the nature assumption of the normal distribution that is used in standard methods) are not proper. Kolmogorov - Smirnov test deals with the basic differences between the cumulative distributions and its basic premise is based on the fact that two samples were obtained from the same continuous distributions. To determine whether the differences between statistical distributions of two sets are significant or not, the number achieved in the test will be compared with the critical value extracted from the table and if the number obtained is smaller, the basic premise is acceptable.

3.4.5 t-Test

T-test is used for statistical comparison between two data series. t-value can be obtained using equation 2-3:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} \tag{2-3}$$

Where $\overline{x}_1$ and $\overline{x}_2$ are mean of observed and dummy data, and respectively s_1 and s_2 are the standard deviation of observed and dummy data, and n_1 and n_2 are the number of observed and dummy data respectively.

After calculating the t-value using the formula 2-3 (tcalc), the amount is compared with value from the table (ttab) based on an appropriate critical level and degree of freedom derived from formulas 3-3. If tcalc < ttab, it is plausible that there is a huge difference between the mean observational and dummy data. The following formula is used to calculate the degree of freedom:

$$\text{d.o.f.} = (n_1 + n_2) - 2 \tag{3-3}$$

3.4.6 Generation of synthetic data

After calibration and evaluation of LARS-WG, meteorological parameters must be generated. Here, the Generator option is used to generate synthetic data which statistical properties are similar to observed data or defined scenario. One of the basic needs of LARS-WG to produce information under climate change conditions is to generate a scenario from GCM model outputs which is automatically done in the fifth version of the program by reading the latitude and longitude of station. The model has been implemented and the outputs are stored in two files containing the statistical properties of observational data, named station-name.stx and station-name.wgx. The file with STX suffix contains the empirical distribution of wet and dry series and files with WGX suffix contains daily synthetic generated data.

3.5 Routing climate change using the Mann-Kendall test

Trend, is a time series long-term behavior and can be imagined as a major time series trend regardless of other seasonal, cyclical and random changes. One of the reasons for the presence of trend in a time series is the indirect involvement of man in nature. For example, the use of fossil fuels by humans and thus, an increase in greenhouse gases caused changes in parameters such as temperature and precipitation that these changes take place slowly and for a long time. To evaluate the trend in this study, non-parametric Mann-Kendall test is used.

Non-parametric Mann-Kendall test provided by Mann in 1945 and then completed by Kendall in 1975 and is based on relevant data in a time series. (Mann, 1945, Kendall, 1975)

The test is used for random checking of data (lack of process) in contrast to presence of trends in hydrological and meteorological time series (Zhang et al., 2005). The advantage of this test over other tests of determining the process is the use of data order in time series regardless of the amount of variables that due to the existence of such a property, these tests can also be used for skewed data and data is not required to be in the form of a special distribution. (Turgay, 2005)

Examined hypothesis in this test is as follows:

H_0: Data are randomly distributed (it does not have a process)

H_1: data have trend.

In this test if $x_{1,}$ $x_{2\ldots}$ x_n observations are concerned, then we have:

$$S=\sum_{k=1}^{n-1}\sum_{j=k+1}^{n} sgn(x_j - x_k) \tag{4-3}$$

$$\text{Sgn}(x) = \begin{cases} +1 \;\; if \;\; (x_j - x_k) > 0 \\ \;\; 0 \;\; if \;\; (x_j - x_k) = 0 \\ -1 \;\; if \;\; (x_j - x_k) < 0 \end{cases} \tag{5-3}$$

In fact, in this test, each data is compared with all data after it. At this point, instead of using the data original values, use the order of the desired data set (time series) and orders can be compared in this way. For this reason, this test is a data order-based test. Assuming that the data are independent and identically distributed, mean and S variance is obtained from the following equation:

$$E(S) = 0 \tag{6-3}$$

$$Var(S) = \frac{n(n-1)(2n+5)-\sum_{i=1}^{m} t_i(t_i-1)(2t_i+5)}{18} \tag{7-3}$$

In the above equation: n is the number of data; m the number of nodes, and t is the number of data per node.By node, we mean if there is more than one, from a data, these equal values form a node, and the number of these equal values in m-th node is t.

The test statistic (Z) has a normal distribution and is obtained from the following equation:

$$Z = \begin{cases} \frac{S-1}{\sqrt{Var(S)}} \quad if \quad S > 0 \\ 0 \qquad\qquad if \quad S = 0 \\ \frac{S+1}{\sqrt{Var(S)}} \quad if \quad S < 0 \end{cases} \tag{8-3}$$

This is a two-sided test. So if [Z] $\leq Z_{\alpha/2}$ the null hypothesis is accepted at confidence level and otherwise, the null hypothesis will be rejected. In the rejection of the null hypothesis (presence of trend), if S> 0, time series has a positive trend (increasing) and if S <0, time series will have a

3.6 IHACRES[15] model

Introduction

IHACRES is rainfall-streamflow modeling software that was developed by Croke in 2008 and Motovilov in 1999. In this study IHACRES v2.1 was used and it is good for basins with continuous rain, temperature and discharge data. Its application is to help the hydrologist or water resource engineers to evaluate the dynamic relation between basin rainfall and streamflow. It's usually used for the followings:

- Characterizing unit hydrographs
- Nonstop time series streamflow modeling
- Environmental change-hydrological regime studies
- Runoff even modeling
- Hydrograph separations (for instance, to help with water quality studies)
- Derivation of a Slow Flow Index
- Derivation of Dynamic Response Characteristics

[15] Identification of unit Hydrographs And Component flows from Rainfall, Evaporation and Streamflow data

- Specifying the relationships between Dynamic Response Characteristics and physical catchment descriptors
- Teaching unit hydrograph theory and its utilizations
- Hydrometric data quality assurance/control (GA/GC)
- Infilling missing streamflow data.

Three basic components of IHACRES are:

- Simulation
- Calibration
- Prediction
- Validation

Overview

The focus in IHACRES is on modeling recognizable catchment-scale rainfall-runoff behavior instead of small-scale hydrological processes that precipitation causes stream flow.

To use IHACRES, it needs to be calibrated to optimize for a known period. So, that a catchment can be distinguished by a small set of parameters. The model takes as input, once calibrated, time series of rainfall and temperature or possible evapotranspiration. The outcome is a time series of simulated stream flow. For calibration time and validation period, observed stream flow is available as well. This would assist measurements of performance to be calculated.

The linear connection between effective rainfall and streamflow permit the use of popular unit hydrograph theory that conceptualizes the catchment as arrangement of linear storages performing in series and/or parallel. All of the non-linearity commonly seen between rainfall and streamflow is accommodated in the (non-linear loss) module that converts rainfall to effective rainfall. The Classic model module has 5 factors that IHACRES need us to set the minimum (Start Value), maximum (Finish Value), and step size (Step Value) for every calibration period. These 5 factors are:

- drying rate at reference temperature (tw)
- temperature dependence of drying rate (f)
- reference temperature (tref)
- moisture threshold for producing flow (l)
- power on soil moisture (p)

Data Requirements

Input data

IHACRES requires three sets of time series data. There are:

- Observed rainfall (in millimeters or inches)
- Temperature (in degrees Celsius, Fahrenheit, or Kelvin) or evapo-transpiration (in millimeters or inches)
- Observed streamflow (in cubic meters per second, megalitres per time step, millimeters per time step, liters per second, or cubic feet per second)

And then a time series of modeled streamflow is produced, along with multiple statistics, which describe the characteristics of each series.

CHAPTER IV

INTRODUCTION TO BASIN

This chapter first introduces the catchment basin. Then, it goes over different steps towards specifying effects of climate changes on the catchment basin of Beaver River.

4.1 The catchment basin

General Description

The Beaver River is a famous name for an irregular river in Oklahoma and it is located in most of the Oklahoma Panhandle. Also it is identified as the North Canadian River; both names are commonly used. The Beaver River come into Oklahoma from New Mexico as the North Canadian River, then assumes an alias at the Oklahoma boundary all the way to Fort Supply, where it again becomes identified as the North Canadian River It moves among Cimarron, Texas, Beaver, Harper and Woodward Counties in the Oklahoma Panhandle east of New Mexico and North of the Texas Panhandle, dropping shortly into Texas northeast of Stratford, the back into

Oklahoma where it is linked by the Goff River in the northwest of Guymon from which it flows east to Optima Lake, formed by a dam on the river southeast of the Town of Optima. At the Beaver Town it flows through Beaver State Park. The Kiowa River flows into the Beaver northwest of Laverne, after that turns southeast to Fort Supply, where it becomes the North Canadian River again.

Ogallala Aquifer is the source of the river in this area. Because of that, and because of growing irrigation and other demands on the mentioned aquifer, the flow of the river in the Panhandle is shallow and irregular, and the Optima Lake has not too much water.

Figure (4-1) shows the Beaver-North Canadian River Catchment basin and Location of Ogallala Aquifer in Oklahoma panhandle

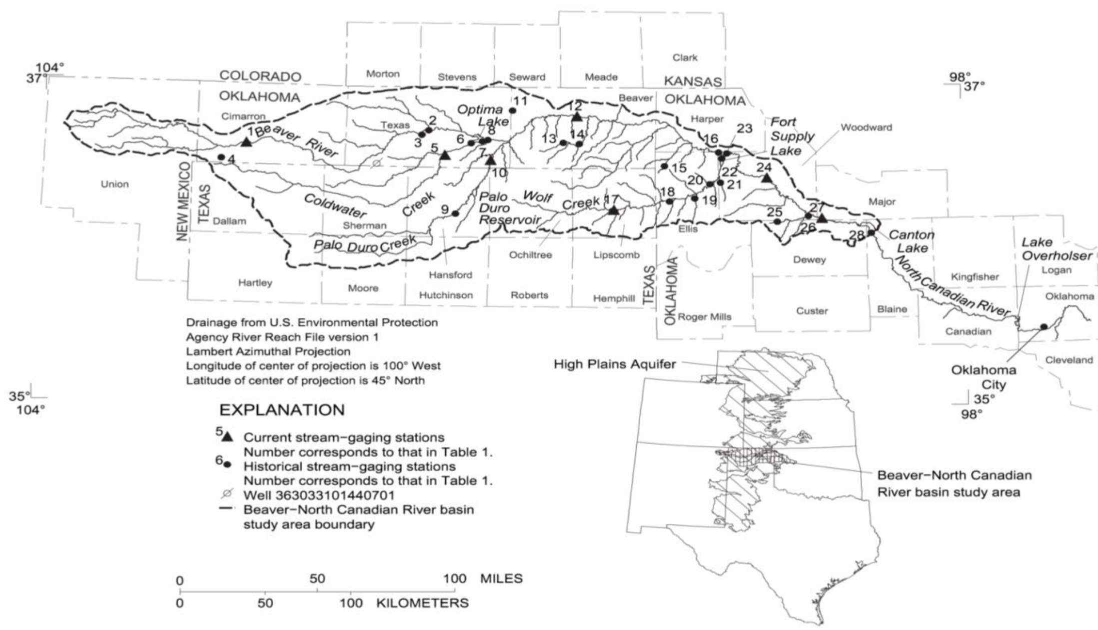


Figure (4-1) location of Beaver-North Canadian River Catchment basin and Ogallala Aquifer in Oklahoma panhandle

The Beaver River is principally a stream with flat water that flows through the plains of the Oklahoma Panhandle area near the Colorado boundary and Kansas to the north. The nearby area is a distant wilderness with a few small towns surrounding. Some places close to river are Oklahoma Panhandle State University and the Optima Wildlife. The Beaver is a low-flow river, and rarely has navigable waters; however it has at sufficient volume of water within its drainage basin a little after a big rain event. It is unlikely to make an uninterrupted run from the headwaters to Fort Supply due to Optima Dam, but whenever sufficient flows exist, the whole reach of the river is navigable with a portage around the dam. Many main highways and county roads crisscross across or parallel to the river all along its path, but signs of civilization are rarely found along the river. The Cimarron River, flowing out of New Mexico, is in in the vicinity to the north except for where it departs to Kansas before re-entering Oklahoma north of the Beaver Town.

Distance from big cities

Oklahoma City 345 miles; Tulsa 450 miles; Dallas 485 miles; Austin 675 miles; San Antonio 652 miles; Houston 731 miles; Little Rock 690 miles; Kansas City 690 miles; Albuquerque 442 miles; Phoenix 900 miles; Denver 321 miles; Salt Lake City 855 miles (all distances are estimated, depends on starting point, destination point at the river and road taken.)

Water Quality and Flow Rates

Water quality is frequently good to very good at controllable flows, although it may be sandy or silty because of the runoff carried from downriver. Flows are frequently shallow, but after local precipitation in the area the river can increase to noticeable levels for limited hours to a few days, then drop again to insufficient levels.

Figure 4-2 shows Annual Temperature and Precipitation History for Oklahoma panhandle (Cimarron, Texas and Beaver counties) from 1895-2013

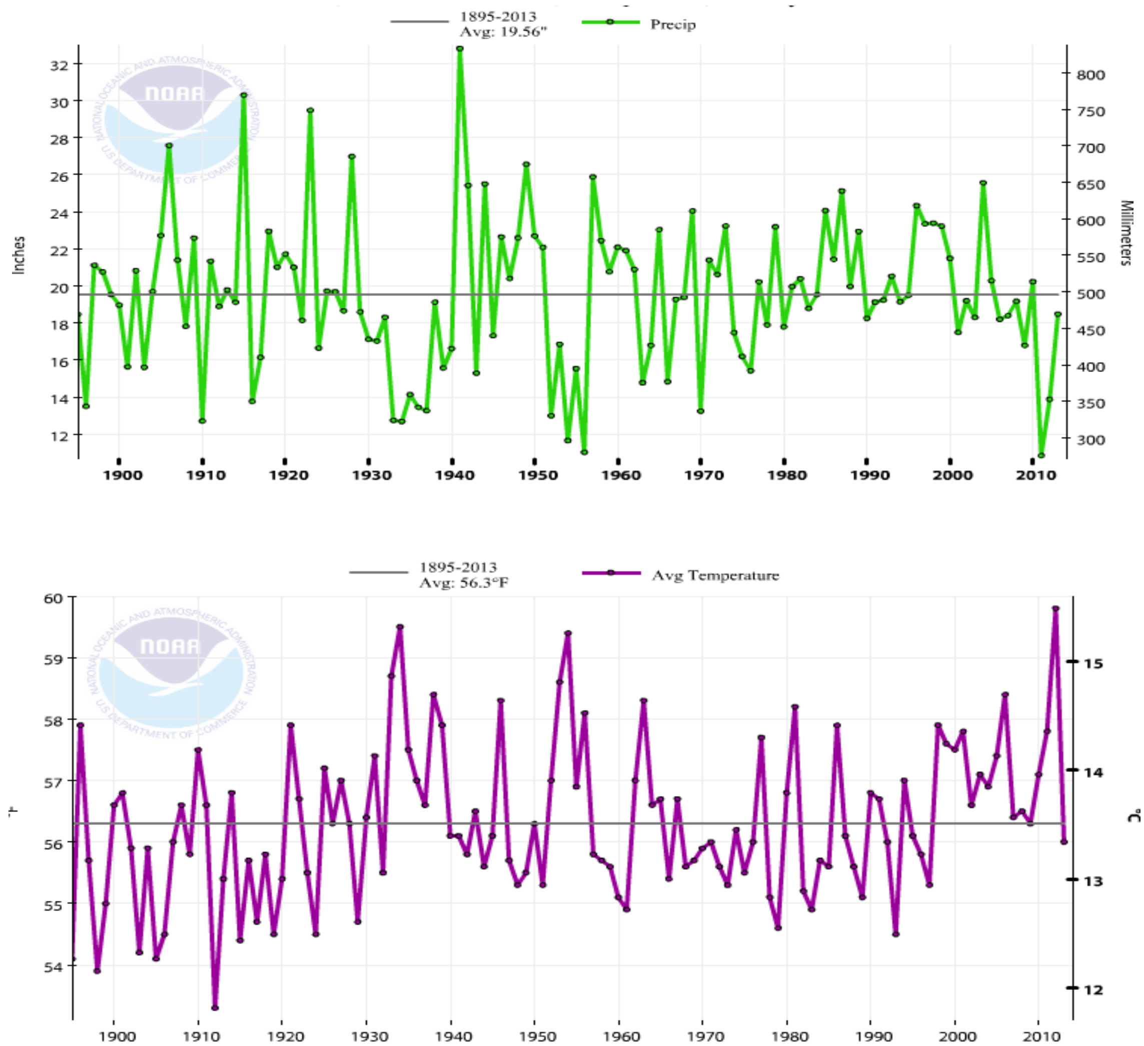


Figure (4-2) Annual Temperature and Precipitation for Oklahoma panhandle from 1895-2013

Water usage

The Beaver-North Canadian River and its tributaries in western Oklahoma are primary sources of public-water supply. Ninety-two percent of the total withdrawals of surface water in the basin upstream of Oklahoma City are for public supply. Optima Lake on the Beaver River near Hardesty, Fort Supply Lake on Wolf Creek near Fort Supply, and Canton Lake on the North Canadian River near Canton provide storage of public-water supplies for western Oklahoma and for the Oklahoma City metropolitan area. Irrigation is the largest use of ground water in the Beaver-North Canadian River basin.

4.2 position of meteorological and hydrometric stations

In order to study the effect of climate change in the catchment basin of Beaver River following stations were selected.

Meteorological Stations:

- Boise city, Goodwell, Hooker, Beaver, and Woodward (refer to table 4-1 and figure 4-3 for locations)

Hydrometric Stations:

- Beaver River near Guymon, Coldwater Creek near Hardesty, Palo Duro Creek at Range, Beaver River at Beaver, Clear Creek near Elmwood, Wolf Creek near Fargo, North Canadian River at Woodward, North Canadian River near Seiling (refer to table 4-2 and figure 4-4 for locations)

The most important reasons for selecting these stations were their available daily statistical data including temperature, rainfall and discharge in the period of 1985 through 2015.

Table (4-1) coordinates of meteorological stations

Station name	Latitude	Longitude	Altitude(m)
Boise City	36.69	-102.49	1267
Goodwell	36.6	-101.6	997
Hooker	36.85	-101.22	912
Beaver	36.8	-100.53	758
Woodward	36.42	-99.41	625

Table (4-2) coordinates of hydrometric stations

Station name	Latitude	Longitude	Drainage area
Beaver River near Guymon	36.72	101.48	5539.9 Square km
Coldwater Creek near Hardesty	36.64	101.21	5094.5 Square km
Palo Duro Creek at Range	36.54	101.08	3918.6 Square km
Beaver river at Beaver	36.82	100.51	20683.6 Square km
Clear Creek near Elmwood	36.64	100.5	440.2 Square km
Wolf Creek near Fargo	36.39	99.62	4206.1 Square km
North Canadian River at Woodward	36.43	99.27	30776.8 Square km
North Canadian River near Seiling	36.18	98.92	32517.3 Square km

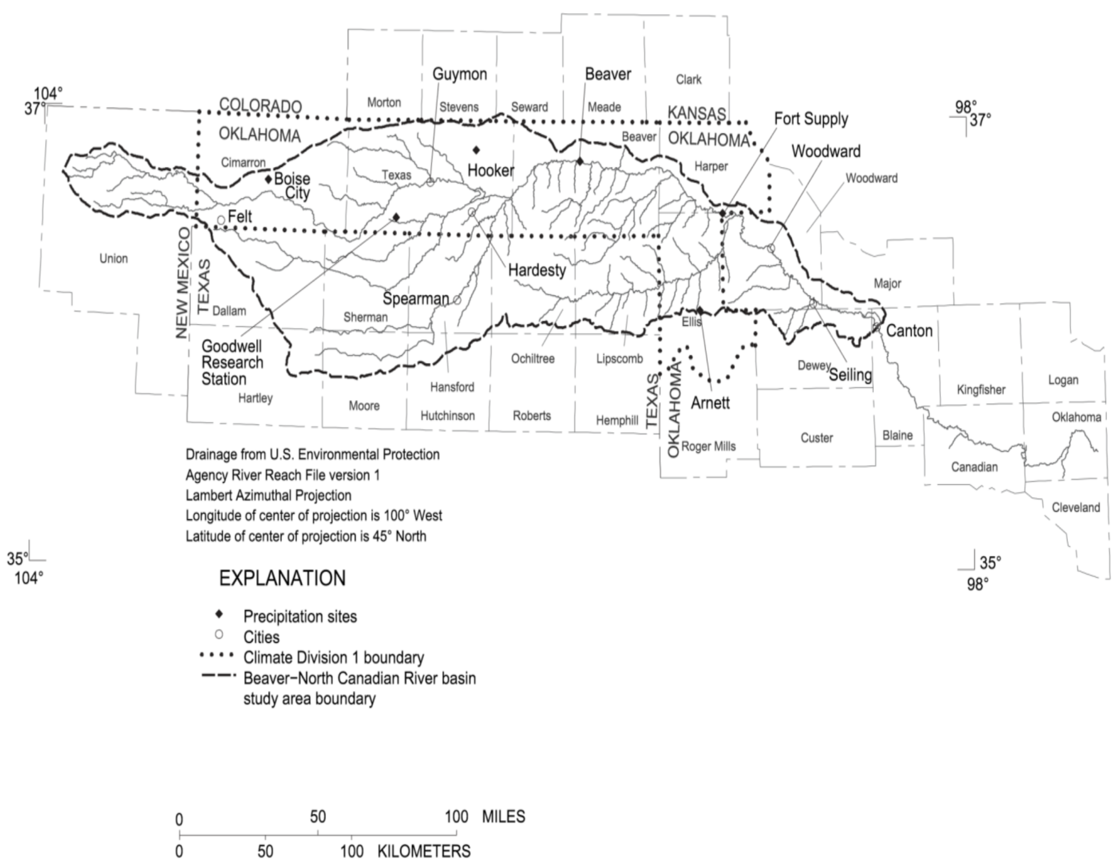


Figure (4-3) location of meteorological stations

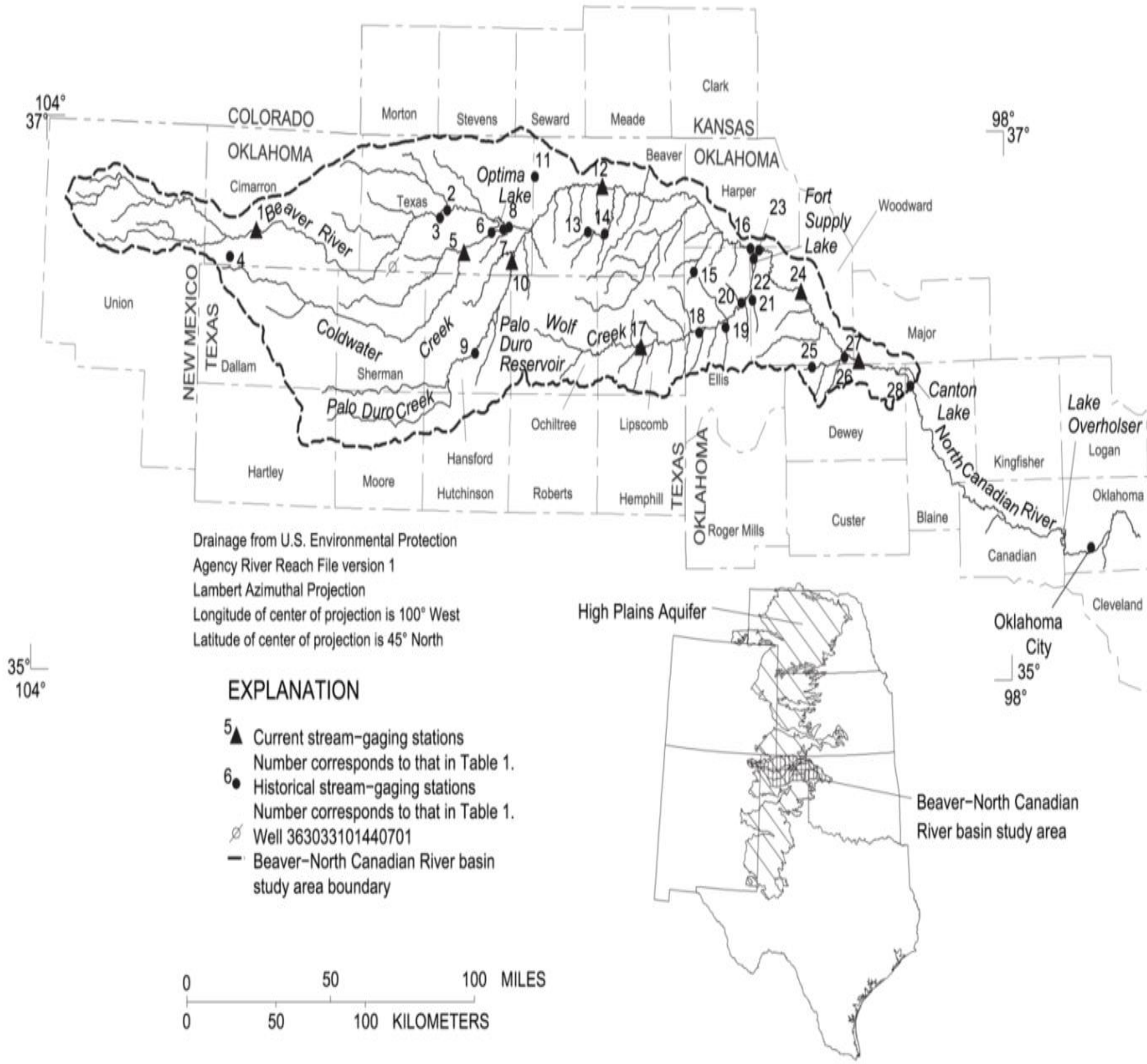


Figure (4-4) location of hydrometric stations

Table 4-3 shows more information about stream gaging stations in the catchment basin. Stations that have been used for this study are highlighted in gray color, it was considered to have at least one station in each state and along with the river direction.

Table (4-3) current and historical stream gaging stations in Beaver River catchment basin

Site #	Station number	Station name	County	Drainage area(mi^2)	Period of record(water years)	Type of data
1	7232250	Beaver River near Felt, Okla.	Cimarron	897	1981-2002	Daily
2	7232500	Beaver River near Guymon Okla.	Texas	2,139	1938-93	Daily
3	7232550	South Fork Tributary near Guymon, Okla.	Texas	0.26	1964-84	Peaks
4	7232650	Aqua Frio Creek near Felt, Okla.	Cimarron	31	1964-75	Peaks
5	7232900	Coldwater Creek near Guymon, Okla.	Texas	1,903	1981-2010	Daily
6	7233000	Coldwater Creek near Hardesty, Okla.	Texas	1,967	1940-64	Daily
7	7233200	Optima Lake near Hardesty, Okla.	Texas	5,029	1978-93	Daily
8	7233210	Beaver River near Hardesty Okla.	Texas	5,029	1978-86	Daily
9	7233500	Palo Duro Creek near Spearman, Tex.	Hansford	960	1945-79	Daily
10	7233650	Palo Duro Creek at Range, Okla.	Texas	1,513	1991-2010	Daily
11	7233850	Sharp Creek Tributary near Turpin, Okla.	Beaver	1	1964-75	Peaks
12	7234000	Beaver River at Beaver, Okla.	Beaver	7,955	1938-94	Daily
13	7234050	North Fork Clear Creek Tributary near Balko, Okla.	Beaver	4	1964-84	Peaks
14	7234100	Clear Creek near Elmwood, Okla.	Beaver	170	1966-93	Daily
15	7234290	Clear Creek Tributary near Catesby, Okla.	Ellis	9.18	1966-84	Peaks
16	7234500	Beaver River near Fort Supply Okla.	Woodward	9,615	1937-50	Peaks
17	7235000	Wolf Creek at Lipscomb, Tex.	Lipscomb	697	1938-2015	Daily
18	7235500	Wolf Creek near Shattuck, Okla.	Ellis	1,183	1938-46	Daily
19	7235700	Little Wolf Creek Tributary near Gage, Okla.	Ellis	17.6	1964-73	Peaks
20	7236000	Wolf Creek near Fargo, Okla.	Ellis	1,624	1943-76	Daily
21	7236050	Wolf Creek Tributary near Tangier, Okla	Woodward	6.23	1964-72	Peaks
22	7236500	Fort Supply Lake near Fort Supply, Okla.	Woodward	1,735	1942-93	Daily
23	7237000	Wolf Creek near Fort Supply, Okla.	Woodward	1,739	1938-93	Daily
24	7237500	North Canadian River at Woodward, Okla.	Woodward	11,589	1939-2015	Daily
25	7237750	Cottonwood Creek near Vici, Okla.	Dewey	11.5	1964-84	Peaks
26	7237800	Bent Creek near Seiling, Okla.	Woodward	139	1967-70	Daily
27	7238000	North Canadian River near Seiling, Okla.	Major	12,261	1947-2015	Daily
28	7238500	Canton Lake near Canton, Okla.	Blaine	12,483	1948-93	Daily

4.3 Methodology

In this research, the following steps for studying the effect of climate change and also hydrological model was taken.

4.3.1 Finding the trend of climate change

In order to find the trend of monthly and yearly climate change in the meteorological stations (refer to figure 4-3 for locations and table 4-1 for their coordinates) Mann-Kendall test was utilized. Rainfall and temperature data was gathered from NCDC[16] website during 1985 to 2015 (Appendix A).

In the next step, by using output of the general circulation medal HADCM3 under A2, B1, and A1B scenarios, future temperature and precipitation for 2016-2045 (Appendix A) and 2046-2075 (Appendix B) was predicted.

4.3.2 Model IHACRES

In this step results from LARS-WG model were used as input data for IHACRES to generate the future river flow. For estimating the Beaver River runoff, daily rainfall (mm) and temperature (degree Celsius) data as input variable for simulating, and observed daily discharge data (cubic meter per second) for calibration were used. Discharge daily data was gathered from USGS[17] website. For running this model, 5 years out of 30 years observed data for calibration and 1 year for validation was chosen. Furthermore, result of modeling river flow was assessed and ability of the model in simulating daily mean discharge was determined. And flow of the Beaver River in the future was projected (Appendix B).

[16] National Climatic Data Center
[17] U.S. Geological Survey

CHAPTER V

FINDINGS

These Results from this chapter can be summarized as follows:

- Evaluating meteorological and hydrometric data trend using Mann-Kendall test
- Producing and downscaling meteorological data for each station
- Converting meteorological data to discharge using IHACRES model

5.1 Evaluating meteorological and hydrometric data trend using Mann-Kendall test.

The results of using Mann-Kendall with 90% confidence are gathered in table 5-1 and 5-2.

Tables are presenting monthly and yearly data for maximum and minimum temperature along with discharge in five different meteorological stations as well as 8 hydrometric stations. This information was gathered from 1985 through 2015.

Table (5-1) Mann-Kendall test results for rainfall and temperature in meteorological stations

Beaver

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Rain	NT*	NT	NT	NT	-*	NT	NT	NT	-	+*	NT	NT	NT
Max,T	+	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Min,T	NT	NT	NT	NT	-	NT	NT	+	NT	NT	NT	NT	NT
Avg, T	NT	-	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT

Woodward

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Rain	-	NT	-	NT	-	NT	NT	NT	-	NT	NT	NT	-
Max,T	NT	-	+	NT	NT	+	NT	NT	NT	NT	NT	NT	NT
Min,T	-	+	NT	NT	NT	+	NT	NT	NT	NT	-	NT	+
Avg, T	NT	-	NT	NT	NT	+	NT	NT	NT	NT	NT	NT	NT

Goodwell

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Rain	NT	NT	NT	NT	-	NT	NT	NT	-	+	NT	NT	-
Max,T	NT	NT	+	+	+	-	NT	NT	NT	NT	+	NT	+
Min,T	NT	NT	NT	NT	NT	NT	-	-	NT	NT	NT	NT	NT
Avg, T	NT	NT	NT	NT	NT	-	-	-	NT	+	+	NT	+

Hooker

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Rain	NT	NT	NT	NT	-	NT	NT	NT	NT	NT	NT	NT	-
Max,T	NT	NT	NT	NT	+	NT	+	NT	+	NT	NT	NT	+
Min,T	NT	NT	NT	NT	NT	NT	NT	+	NT	NT	NT	NT	+
Avg, T	NT	NT	NT	NT	+	+	+	+	+	+	+	NT	+

Boise City

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Rain	NT	NT	NT	NT	-	+	NT	NT	NT	+	NT	NT	-
Max,T	NT	NT	NT	NT	+	+	+	+	+	NT	+	NT	+
Min,T	NT	NT	+	NT	-	NT	+	NT	NT	NT	NT	NT	NT
Avg, T	NT	NT	NT	NT	NT	+	NT	+	+	NT	NT	NT	NT

*NT is short form for ‘’No Trend’’
* Minus and plus signs are for Decreasing and Increasing, respectively.

Table (5-2) Mann-Kendall test results for discharge in hydrometric stations

station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Beaver river at Beaver	-*	-	-	-	-	-	-	-	-	-	-	-	-
North Canadian River at Woodward	-	-	-	-	-	-	-	-	-	-	-	-	-
Wolf Creek near Fargo	NT*	-	NT	NT	-	-	-	NT	NT	NT	NT	NT	-
Clear Creek near Elmwood	-	-	-	NT	NT	NT	NT	NT	NT	-	-	-	-
Palo Duro Creek at Range	NT	-	-	NT	-	NT	NT	-	NT	NT	NT	NT	-
North Canadian River near Seiling	-	-	-	-	-	-	NT	NT	NT	-	-	-	-
Coldwater Creek near Hardesty	-	NT	NT	NT	-	NT	NT	NT	NT	NT	NT	NT	-
Beaver River near Guymon	-	-	-	-	-	-	-	-	-	-	-	-	-

*NT is short form for ''No Trend''
* Minus and plus signs are for Decreasing and Increasing, respectively.

Mann-Kendall yearly rainfall results during 1985 to 2015 are showing decreasing trend in all stations except for Beaver that does not have any trend. Maximum temperature has an increasing trend in Goodwell, Hooker, and Boise city stations. Looking at the tables, also there is an increase in minimum temperature in Hooker and Woodward stations. Average temperature is increasing in Goodwell and Hooker during this period while no trend was found in other stations.

When looking at the monthly results, in spring and summer increasing in maximum temperature can be seen in Goodwell, Hooker and Boise city stations. On the other hand, in May, January, and July reduction in minimum temperature trend is happening in Beaver, Woodward, and Goodwell, respectively. The average temperature in all stations has either an increasing or no trend except for month of February in Beaver and Woodward and summer in goodwell station.

When it comes to monthly rainfall trend, either decreasing or no trend can be seen in all the stations except for month of October in Beaver, Goodwell and Boise City stations. According to table 5-2, yearly results of the test show reduction in discharge of hydrometric station. And monthly results show either decreasing or no trend in most stations.

5.2 Downscaling and generate metrological data

In this section, first the ability of LARS-WG in producing temperature and rainfall data during 1985 through 2015 in 5 different stations were analyzed. In order to evaluate software's ability p-value was obtain on a monthly and yearly base. This will help understand and compare observational data with model's output, which shows the accuracy of the method. Table 5-3, 5-4, and 5-5 present these p-values.

Table (5-3) rain simulating P-Value amount with LARS-WG model in meteorological stations

station month	Beaver	Woodward	Goodweel	Hooker	Boise City
JAN	1	0.9993	1	0.9992	0.9988
FEB	0.9989	1	0.9876	0.9983	0.9619
MAR	1	1	1	0.9809	0.9619
APR	1	0.9971	0.9705	0.7144	0.9936
MAY	0.9963	0.9999	1	0.9995	0.0939
JUN	1	0.9971	0.9725	1	1
JUL	0.9921	0.2312	0.1234	1	1
AUG	0.0456	0.3456	0.0021	1	1
SEP	0.2345	0.1042	0.1736	1	1
OCT	0.9824	1	0.9988	1	1
NOV	0.9705	0.997	0.537	0.6609	0.9875
DEC	1	0.9968	0.9743	0.9998	0.9999

Table (5-4) T-MAX simulating P-Value amount with LARS-WG model in meteorological stations

station month	Beaver	Woodward	Goodwell	Hooker	Boise City
JAN	0.9989	0.9989	0.9989	0.9989	1
FEB	0.9989	0.9989	0.9989	0.9989	0.9989
MAR	1	1	1	1	1
APR	1	1	1	1	0.9991
MAY	0.9991	0.9989	0.9991	0.9989	0.9989
JUN	0.9989	0.9989	0.9989	0.9989	0.9989
JUL	1	0.9989	1	0.9989	0.9989
AUG	0.9125	0.9125	0.9989	0.9125	0.9125
SEP	0.9989	1	0.9989	0.9989	0.9989
OCT	0.9989	0.9989	0.9989	0.9989	0.9989
NOV	1	1	0.9989	1	0.9991
DEC	1	0.9991	1	1	1

Table (5-5) T-MIN simulating P-Value amount with LARS-WG model in meteorological stations

station month	Beaver	Woodward	Goodwell	Hooker	Boise City
JAN	0.9989	0.9989	1	0.9991	1
FEB	0.9125	0.9989	1	0.9991	1
MAR	1	0.9991	1	1	1
APR	0.9991	1	0.9989	1	1
MAY	1	1	1	0.9991	1
JUN	1	1	0.9989	0.9989	0.9989
JUL	0.9991	1	0.9991	0.9989	0.9989
AUG	0.9989	0.9989	0.9125	0.9125	0.9989
SEP	0.9989	1	0.9989	0.9989	0.9989
OCT	0.9991	0.9989	0.9991	1	0.9991
NOV	1	1	1	1	1
DEC	0.9991	1	0.9989	1	0.9989

Table 5-3 suggests that P-values obtained from comparing the simulated and observational data are very satisfactory which in fact presents the accuracy of the model. However, in August and September in Beaver station, and in August, September and July in Woodward and Goodwell P-values are not promising. We can conclude that rainfall simulations in dry seasons are not as precise as in other seasons.

According to table 5-4 and 5-5 and the p value result of simulating minimum and maximum temperature, in all the stations and all months in the year the model has a good ability to simulate these 2 parameters.

Figure 5-1, 5-2, and 5-3 are presenting rainfall, minimum and maximum temperature simulation results respectively. Data are gathered from 1985 through 2015 period using LARS-WG model.

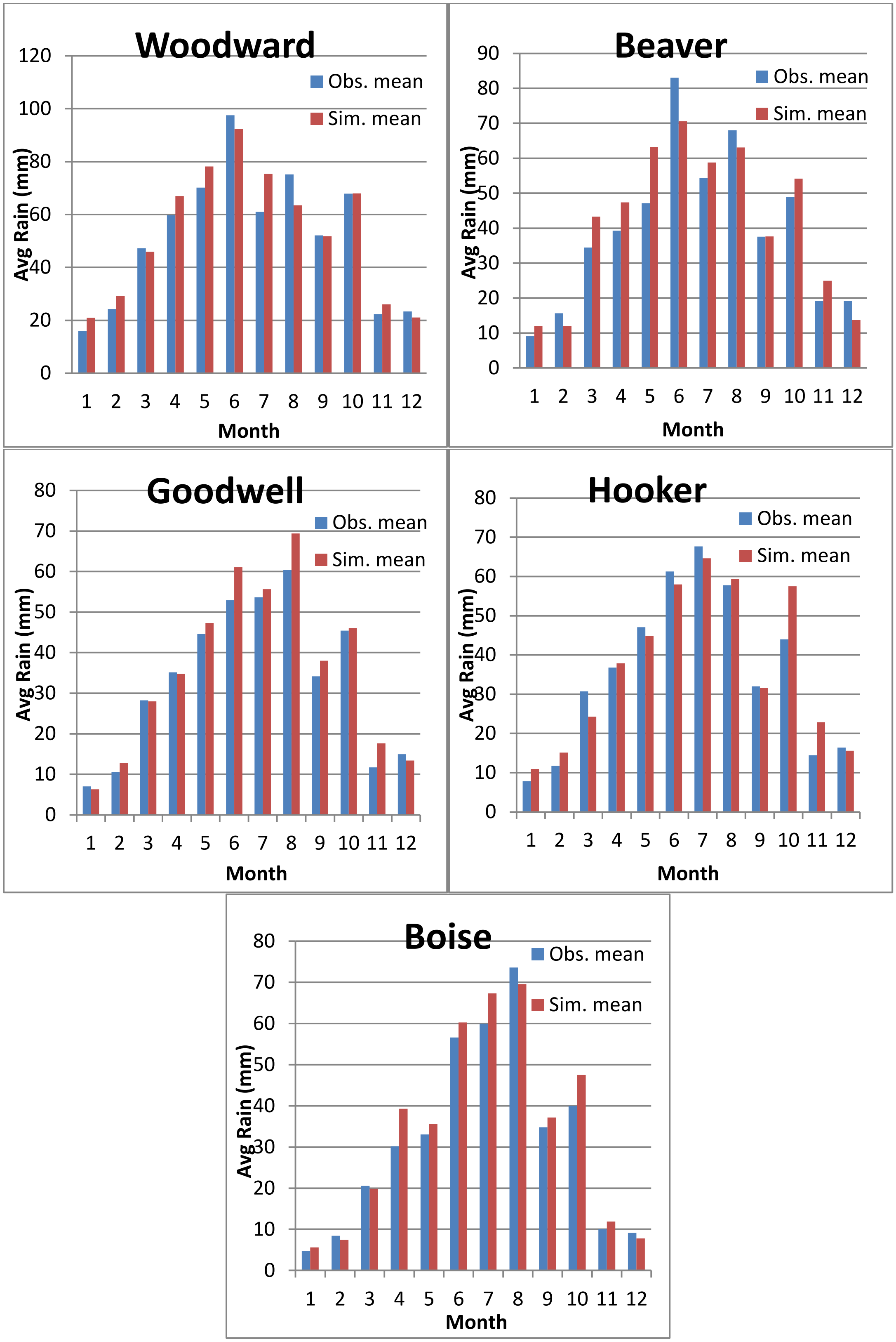


Figure (5-1) LARS-WG results in simulating rain (mm)

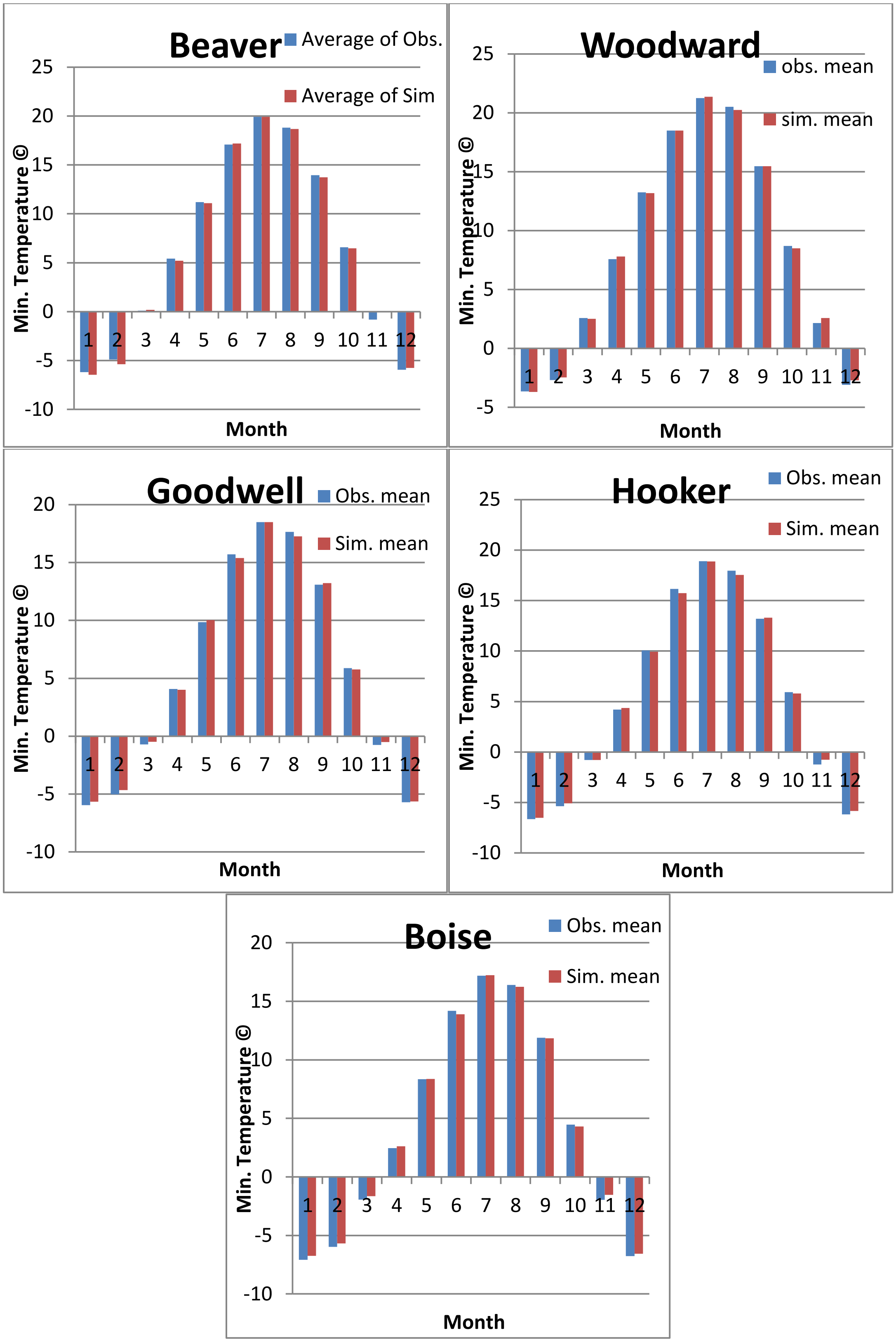


Figure (5-2) LARS-WG results in simulating minimum temperature [°C]

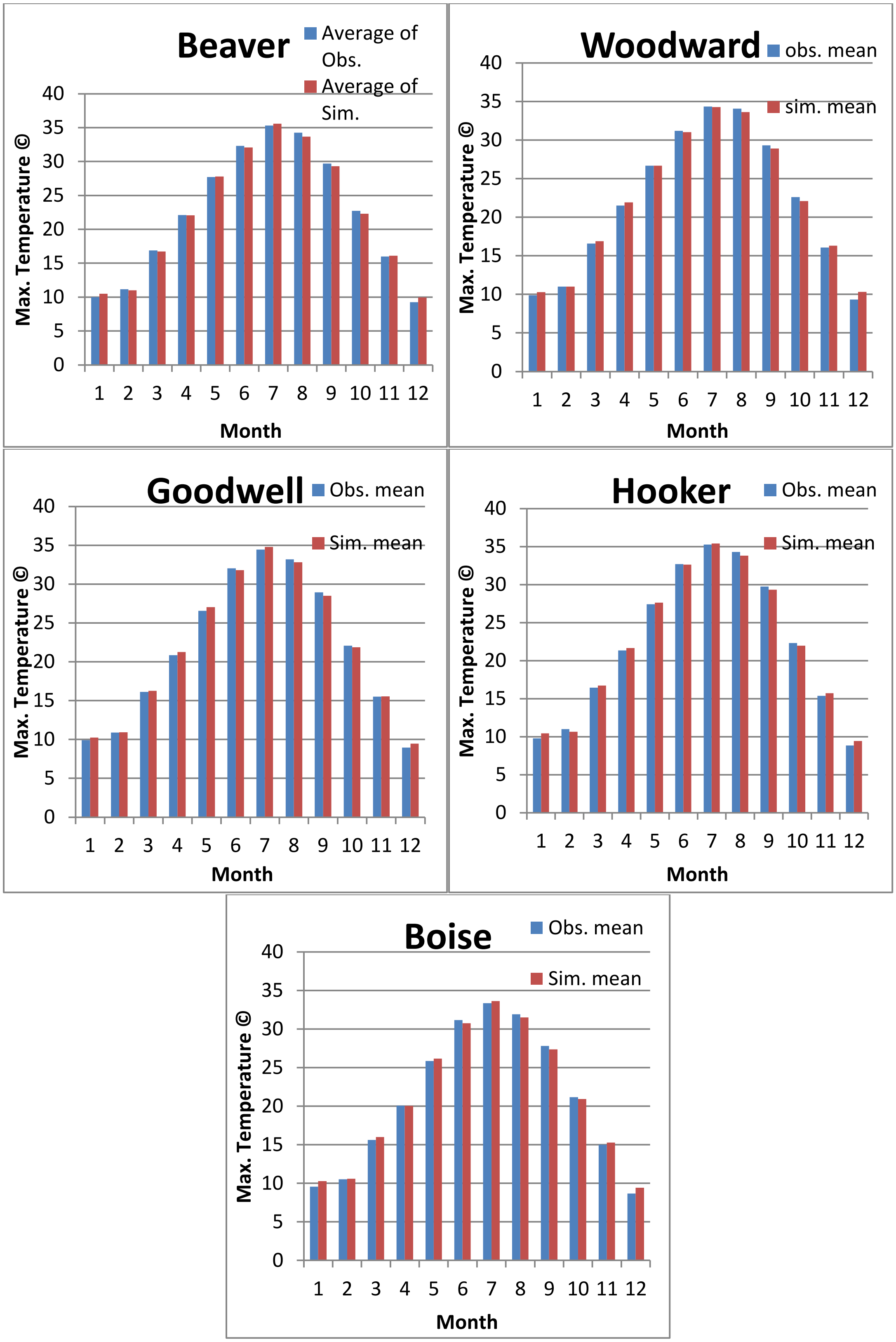
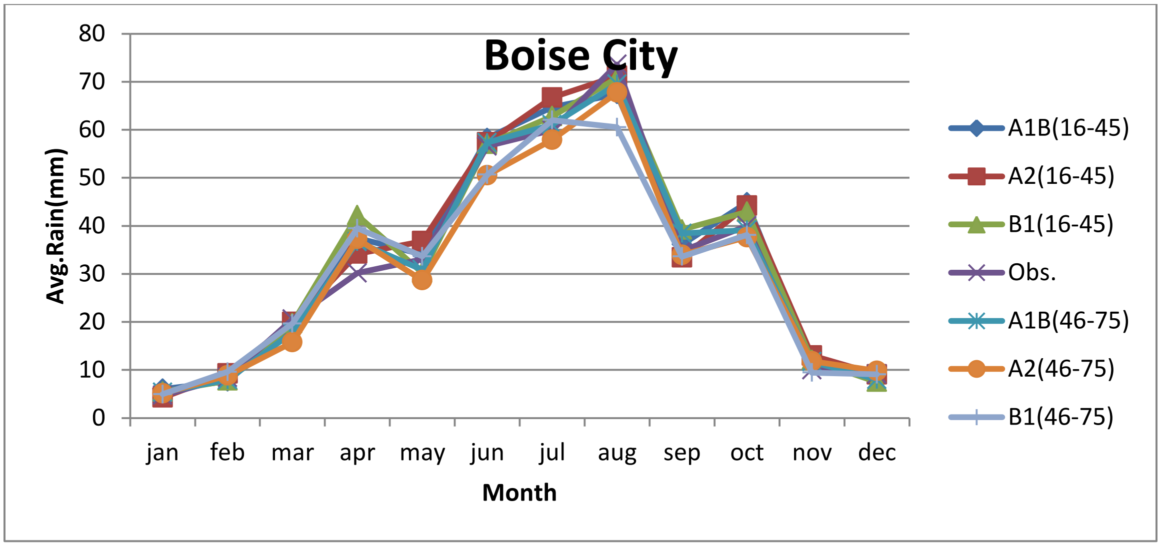
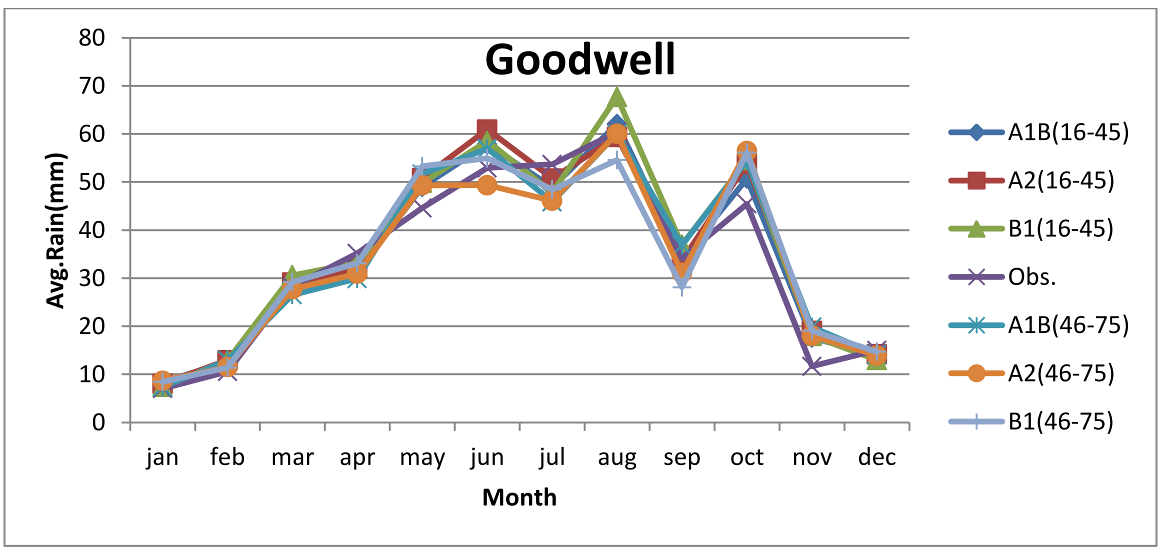
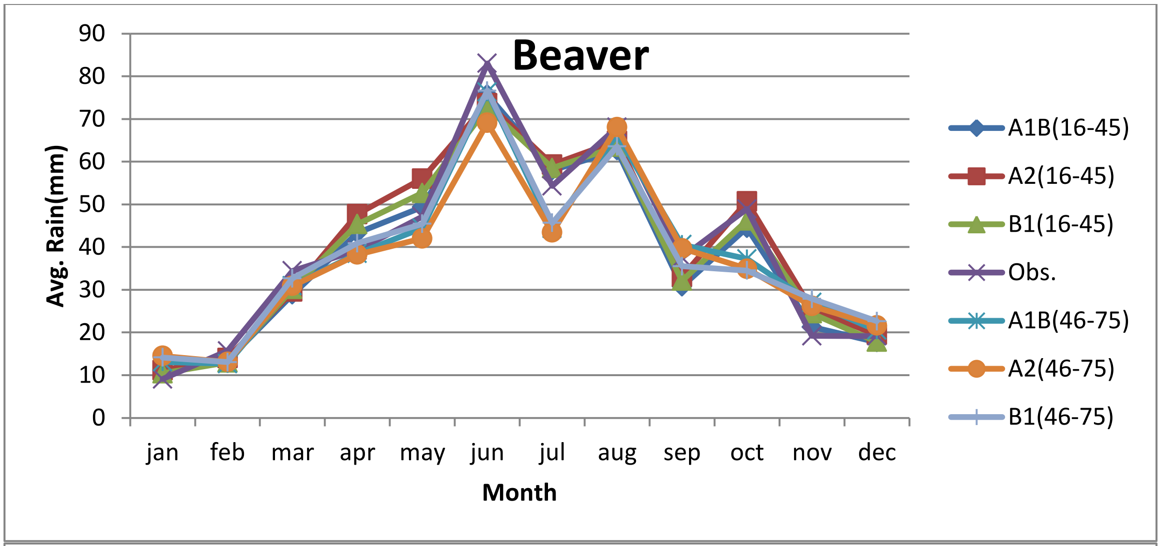


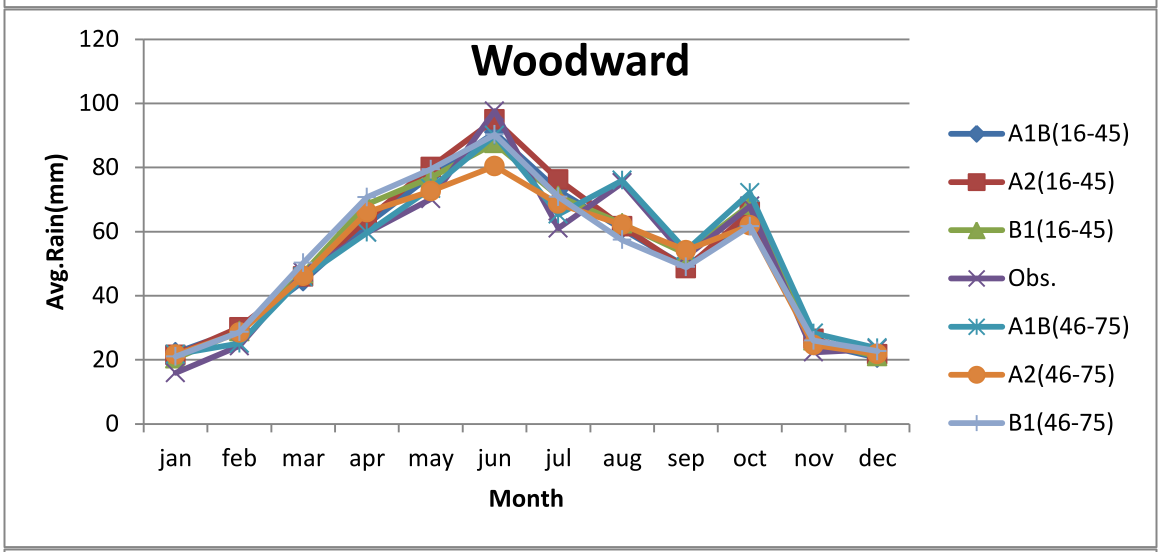
Figure (5-3) LARS-WG results in simulating maximum temperature [°C]

Consequently, according to the results we can use LARS-WG under A2, B1 and A1B scenarios for predicting rain, maximum and minimum temperature in Beaver River for 2016-2045 and 2046-2075. The results of the prediction are summarized in Figure 5-4 to Figure 5-6.









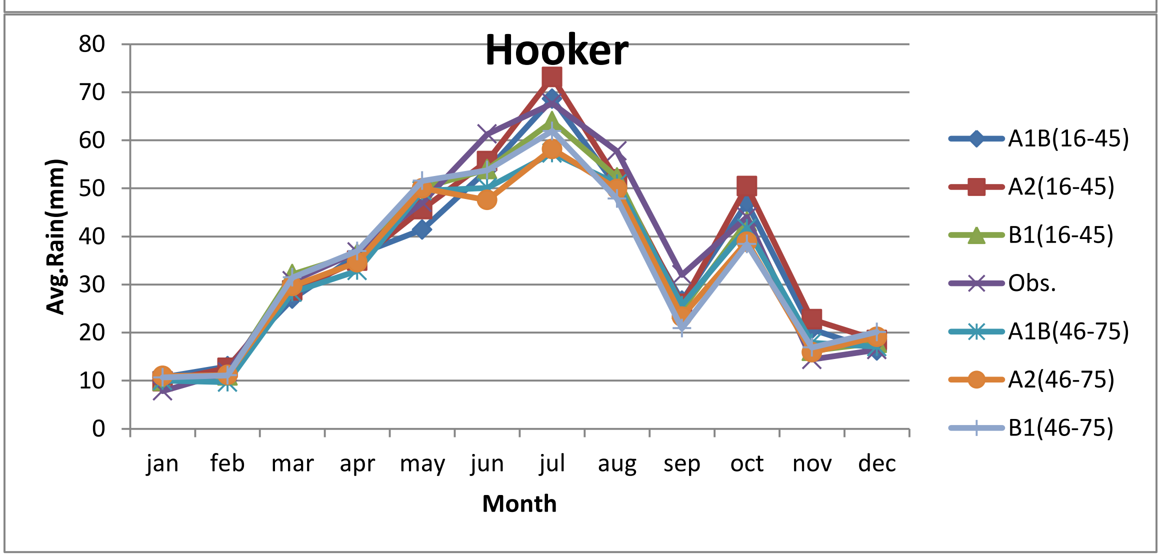


Figure (5-4) comparing observed rain with simulated rain from the model (mm)

Looking at Figure 5-4 and table 5-6 following results were found:

- Goodwell station has an increasing trend in rain based on 3 scenarios for 2016-2045 and 2046-2075. Same thing occurred for Boise city except for A2 and B1 scenarios in 2046-2075. Also Woodward station will experience an increase in rainfall under all scenarios excluding A2 scenario in 2046-2075. But In Beaver and Hooker stations the trend for rainfall in decreasing except for A2 scenario in 2016-2045.

- Highest increase in rainfall can be seen at Goodwell station under B1 scenario within 2016-2045 with approximately 7.9%.

- On the other hand, highest decrease in rainfall happened at Hooker station in connection with A2 scenario within 2046-2075 with 8.9% drop.

Table 5-6 summarizes the result of this prediction.

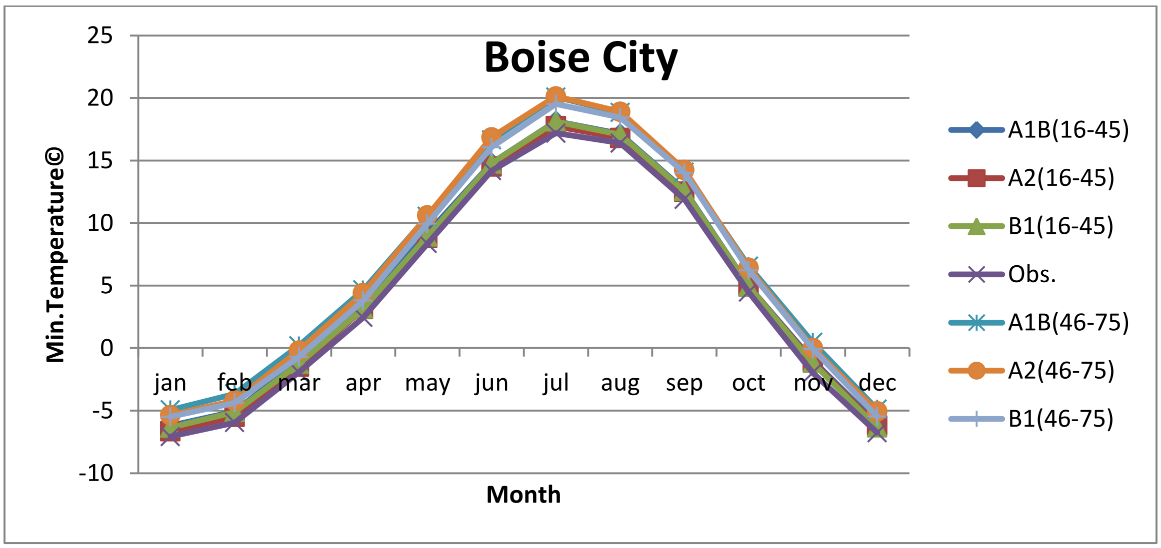
Goodwell station has an increase in precipitation by approximately 4.4% based on A1B scenario in 2046-2075. However, in Hooker station 8.5% decrease occurs under the same scenario. This discrepancy can be explained as follows:

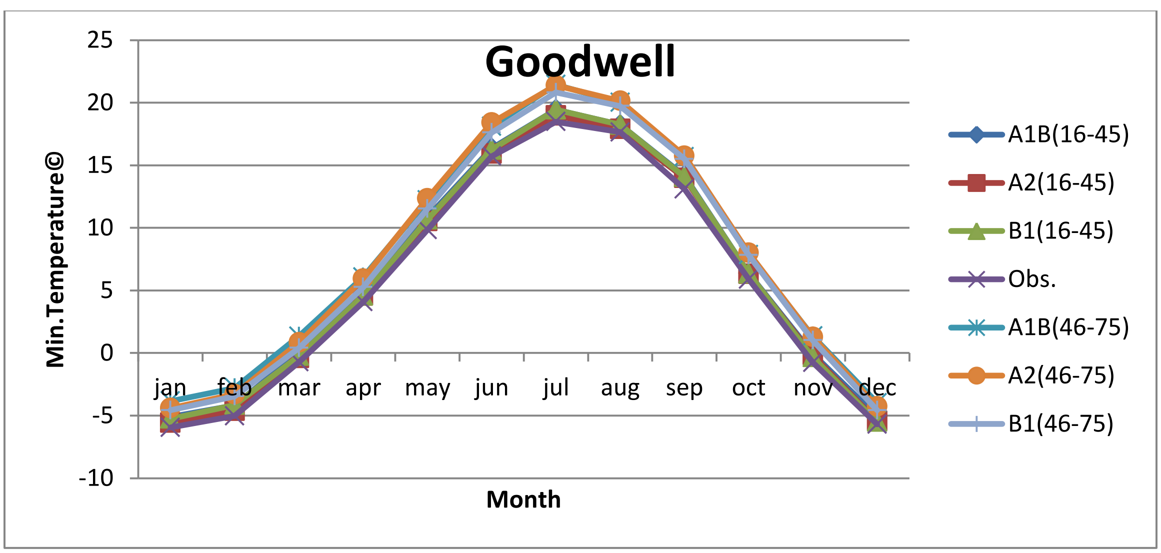
1. Difference in elevation of these stations could have cause issues in modeling. As it can be seen, Goodwell is located at 997 meter above sea level as opposed to Hooker, which is about 912 meter. This variation can affect the station to see different weather conditions which would be be the main reason for the discrepancy mentioned.

2. Lack of uniformly calibrating stations by LARS-WG model

Table (5-6) change in rainfall (%)

station/scenario	A1B(16-45)	A2(16-45)	B1(16-45)	A1B(46-75)	A2(46-75)	B1(46-75)
beaver	-4.00	1.91	-1.84	-4.99	-7.12	-4.87
boise	3.74	4.84	4.40	0.74	-4.17	-2.70
goodwell	3.85	6.40	7.88	4.40	1.05	3.12
hooker	-3.79	0.55	-3.74	-8.59	-8.99	-6.11
woodward	0.39	3.22	2.31	2.97	-1.35	1.77





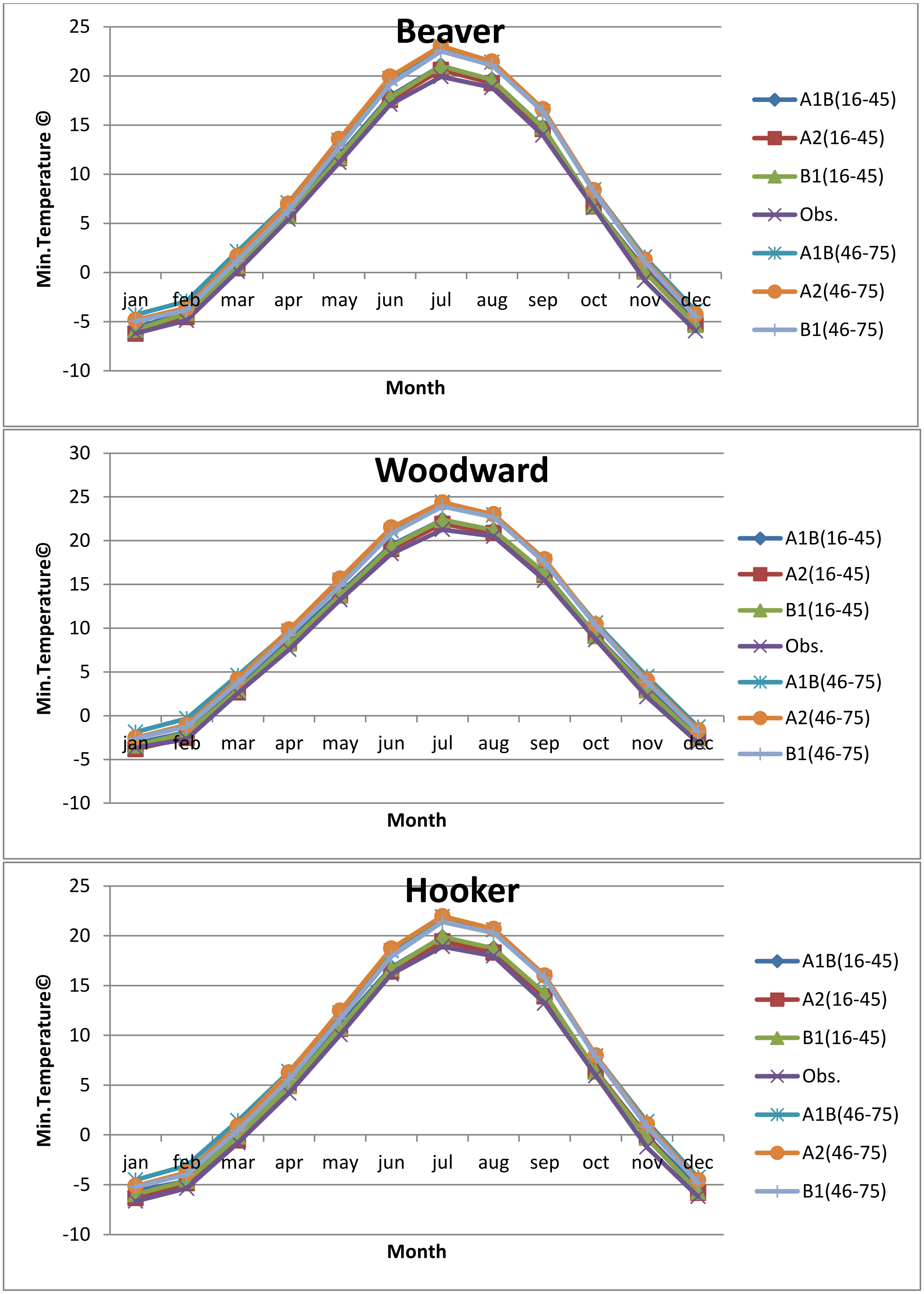


Figure (5-5) comparing observed and simulated Min. Temperature from the model [℃]

As per figure 5-5 and table 5-7, in all the stations and under all scenarios the minimum temperature in the future is increasing. The highest increase for minimum temperature appears to be under A1B scenario in Hooker station in 2046-2075, which is about 2.33 degree centigrade.

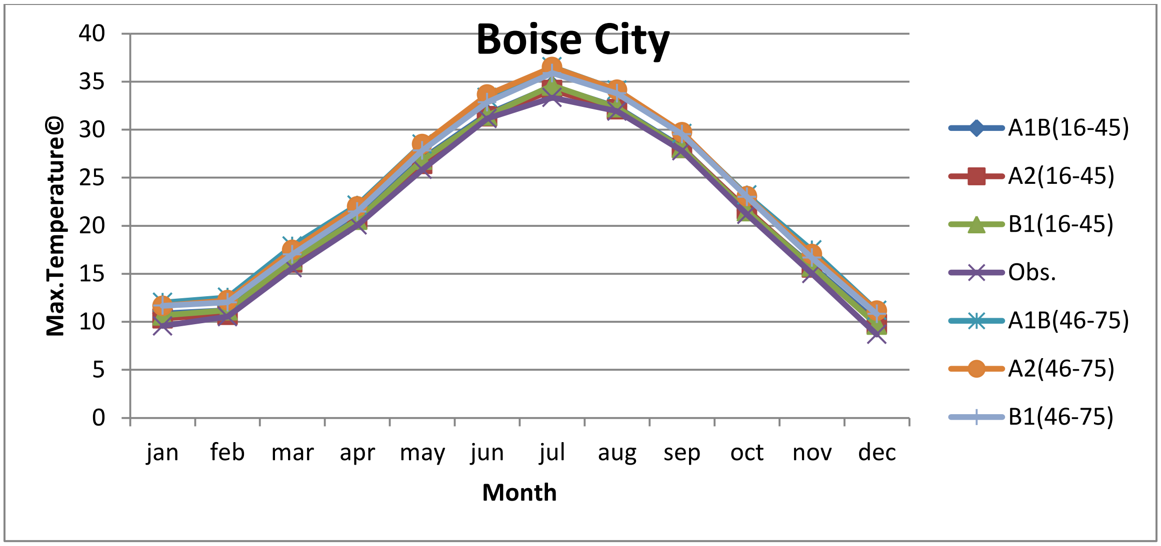
Table (5-7) Change in Minimum Temperature (°C)

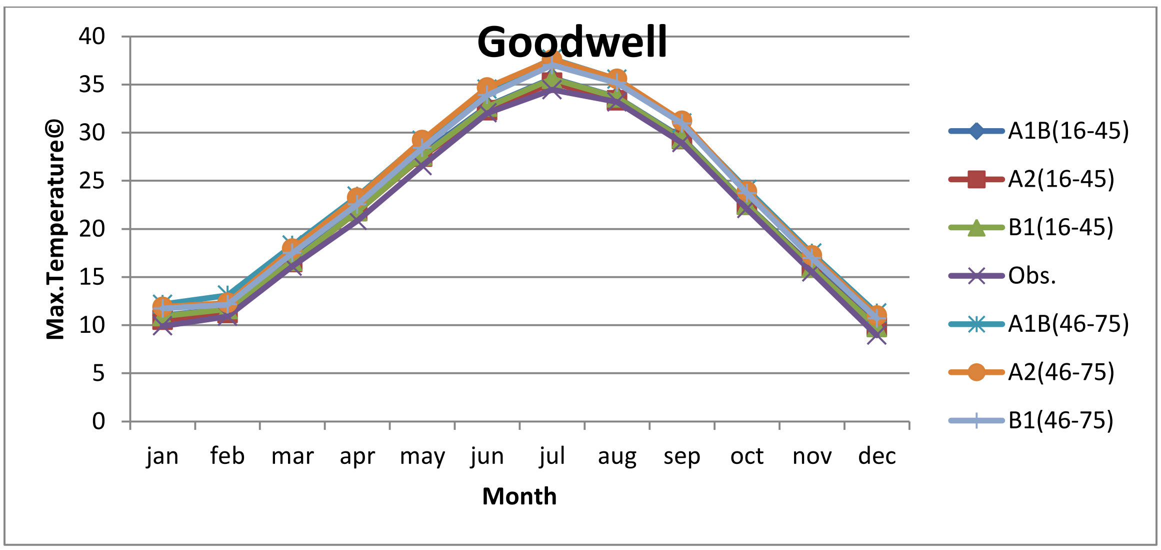
station/scenario	A1B(16-45)	A2(16-45)	B1(16-45)	A1B(46-75)	A2(46-75)	B1(46-75)
beaver	0.79	0.45	0.63	2.22	2.08	1.68
boise	0.81	0.53	0.67	2.28	2.13	1.72
goodwell	0.78	0.45	0.63	2.23	2.13	1.71
hooker	0.85	0.50	0.71	2.33	2.20	1.78
woodward	0.81	0.43	0.63	2.23	2.10	1.72

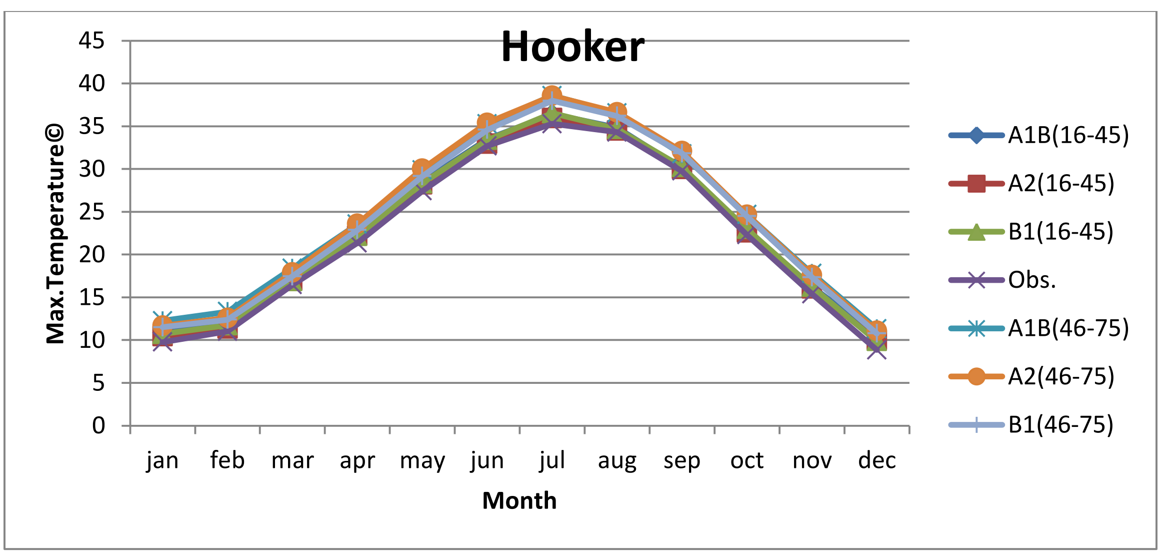
Table 5-8 and figure 5-6 demonstrate the result of maximum temperature estimation in future. The results show that in all the stations under all scenarios maximum temperature has increased. Highest increase in maximum temperature is approximately about 2.39 degree centigrade that occurs under A1B scenario in Hooker station from 2046-2075.

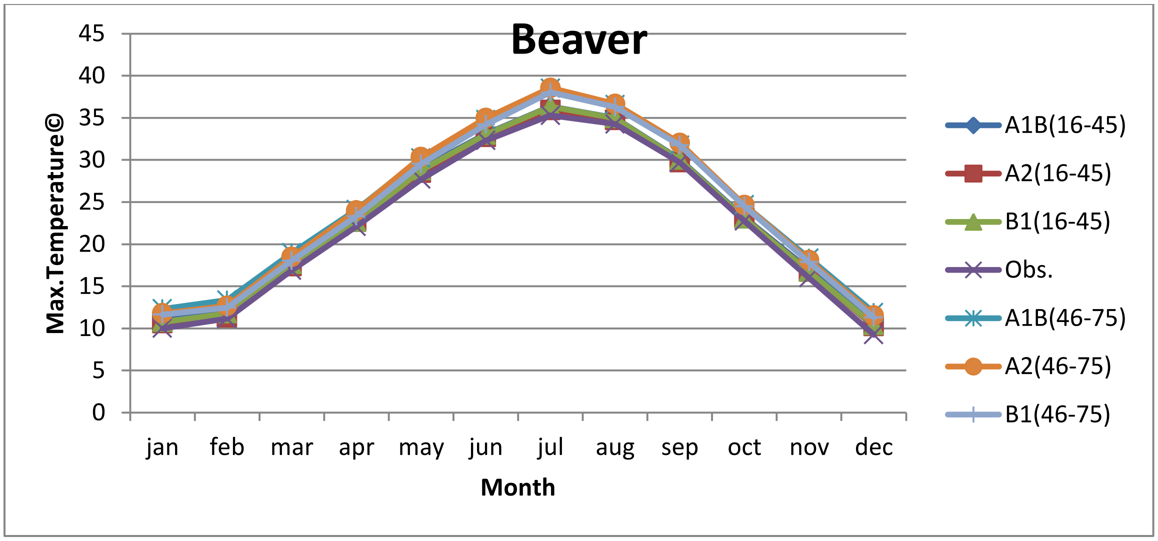
Table (5-8) Change in Maximum Temperature (°C)

station/scenario	A1B(16-45)	A2(16-45)	B1(16-45)	A1B(46-75)	A2(46-75)	B1(46-75)
beaver	0.91	0.52	0.72	2.33	2.19	1.79
boise	0.82	0.53	0.70	2.32	2.20	1.82
goodwell	0.88	0.55	0.72	2.34	2.19	1.77
hooker	0.89	0.53	0.76	2.39	2.26	1.83
woodward	0.80	0.43	0.63	2.27	2.09	1.72


Boise City
40
35
30
25
20
15
10
5
0
Max.Temperature©
jan feb mar apr may jun jul aug sep oct nov dec
Month
A1B(16-45)
A2(16-45)
B1(16-45)
Obs.
A1B(46-75)
A2(46-75)
B1(46-75)


Goodwell
40
35
30
25
20
15
10
5
0
Max.Temperature©
jan feb mar apr may jun jul aug sep oct nov dec
Month
A1B(16-45)
A2(16-45)
B1(16-45)
Obs.
A1B(46-75)
A2(46-75)
B1(46-75)


Hooker
45
40
35
30
25
20
15
10
5
0
Max.Temperature©
jan feb mar apr may jun jul aug sep oct nov dec
Month
A1B(16-45)
A2(16-45)
B1(16-45)
Obs.
A1B(46-75)
A2(46-75)
B1(46-75)



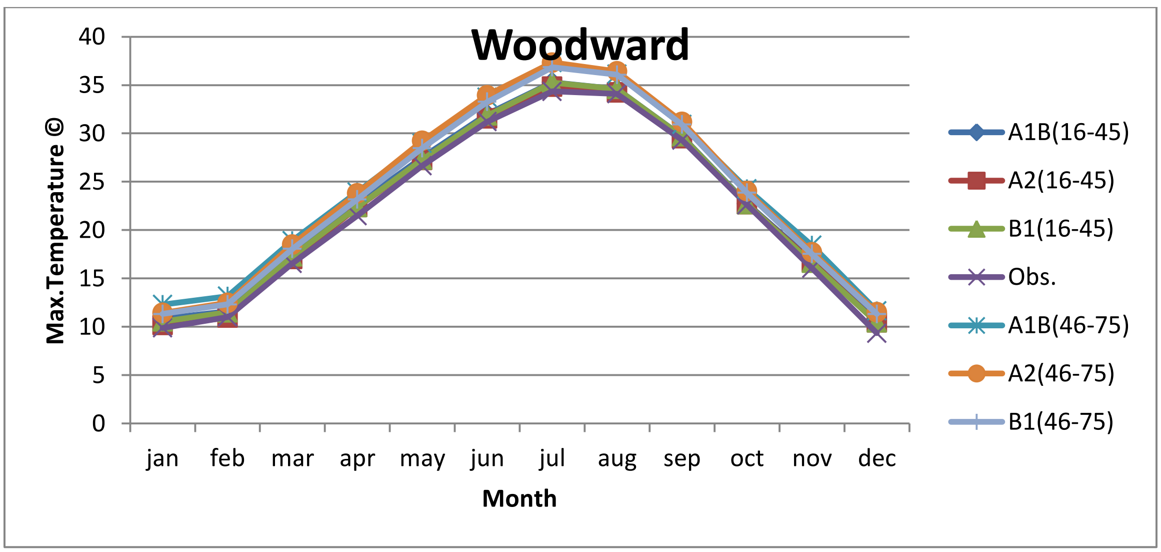
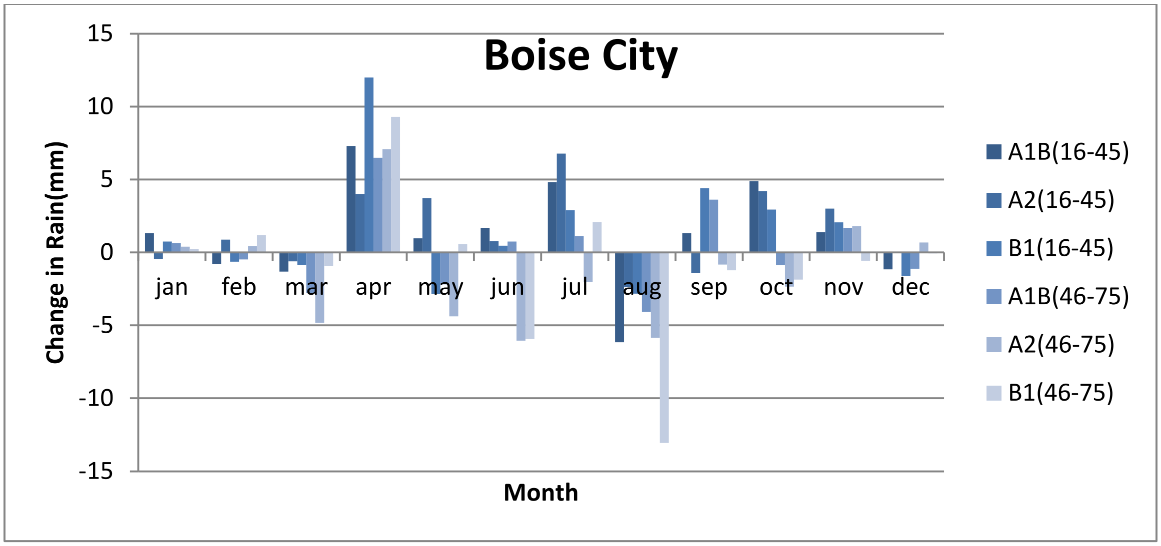
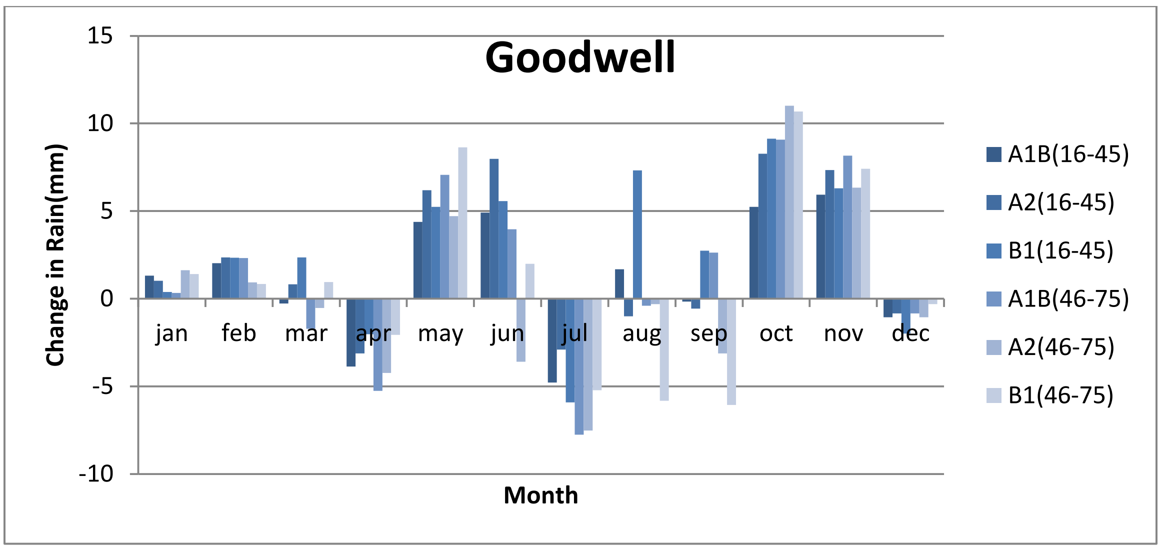


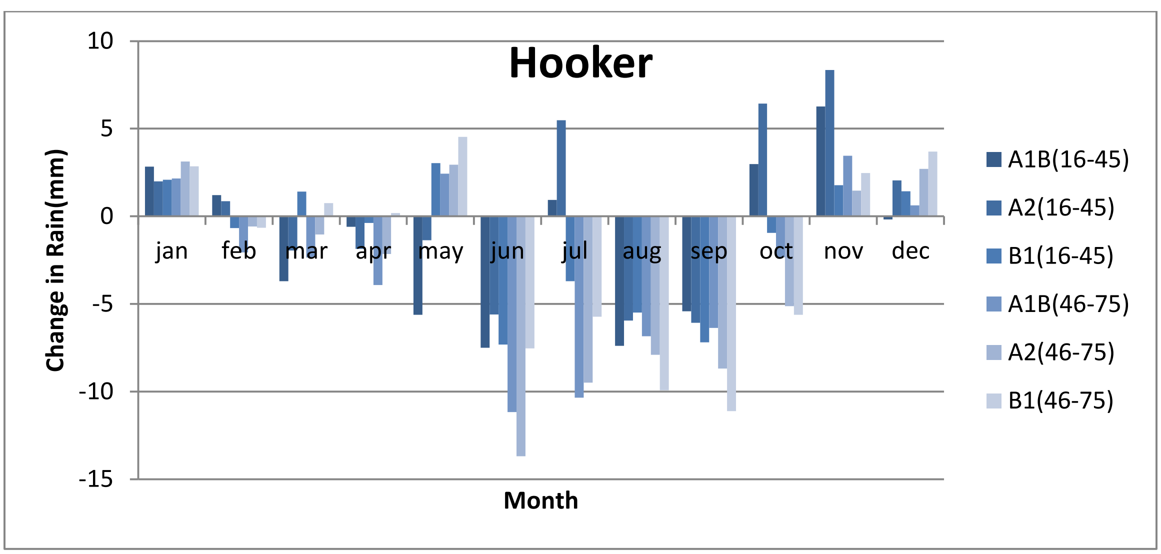
Figure (5-6) comparing observed and simulated Max. Temperature from the model [℃]

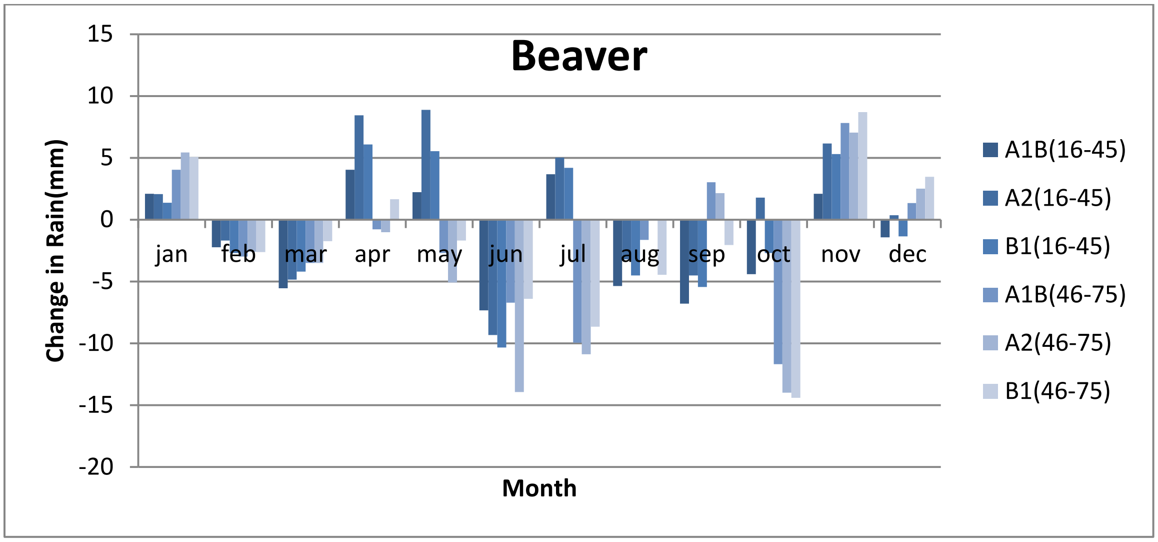
Figure 5-7 is presenting changes in monthly rainfall trend in 5 different stations under three scenarios for future periods 2016-2045 and 2046-2075. According to the figure, rain distribution has changed in all stations.

Figure 5-8 and 5-9 is demonstrating monthly changes in maximum and minimum temperature trend. They are suggesting increase in minimum and maximum temperature in all the stations throughout the year under all the scenarios.


Boise City
Change in Rain(mm)
15
10
5
0
-5
-10
-15
jan
feb
mar
apr
may
jun
jul
aug
sep
oct
nov
dec
Month
A1B(16-45)
A2(16-45)
B1(16-45)
A1B(46-75)
A2(46-75)
B1(46-75)


Goodwell
Change in Rain(mm)
15
10
5
0
-5
-10
jan
feb
mar
apr
may
jun
jul
aug
sep
oct
nov
dec
Month
A1B(16-45)
A2(16-45)
B1(16-45)
A1B(46-75)
A2(46-75)
B1(46-75)


Hooker
Change in Rain(mm)
10
5
0
-5
-10
-15
jan
feb
mar
apr
may
jun
jul
aug
sep
oct
nov
dec
Month
A1B(16-45)
A2(16-45)
B1(16-45)
A1B(46-75)
A2(46-75)
B1(46-75)



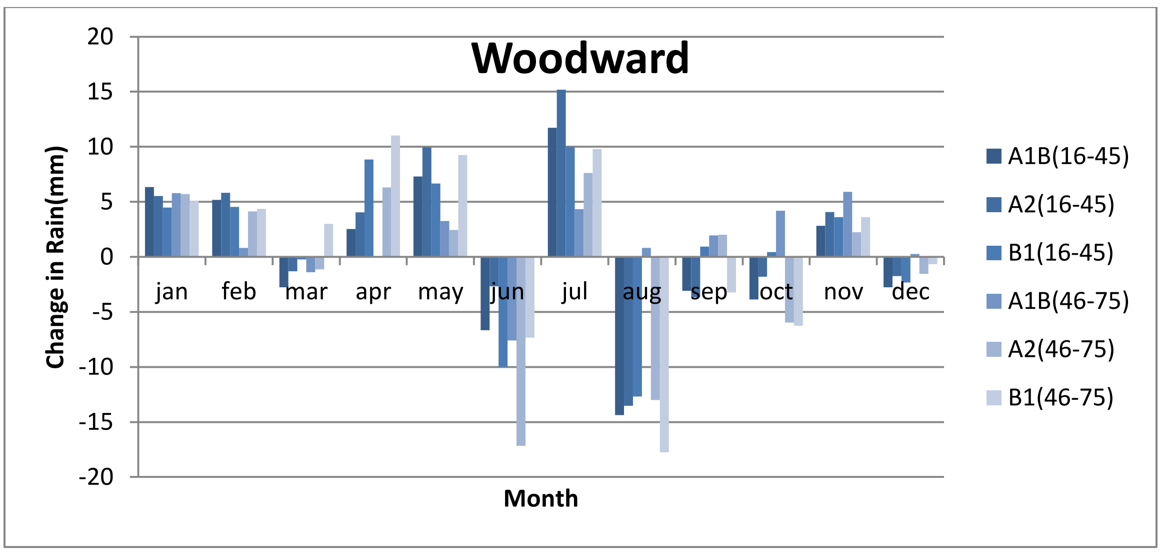
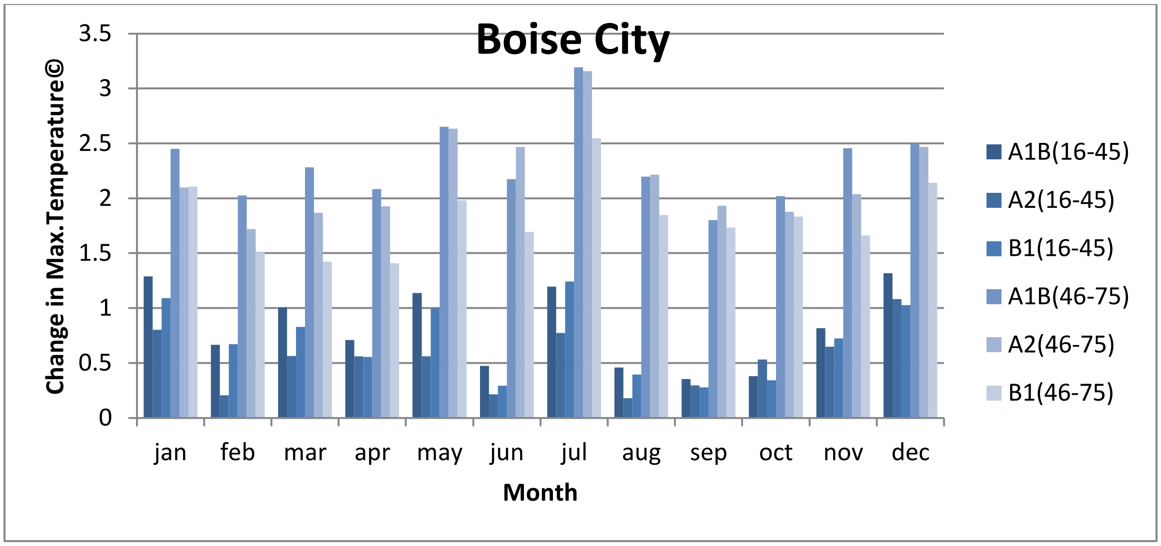
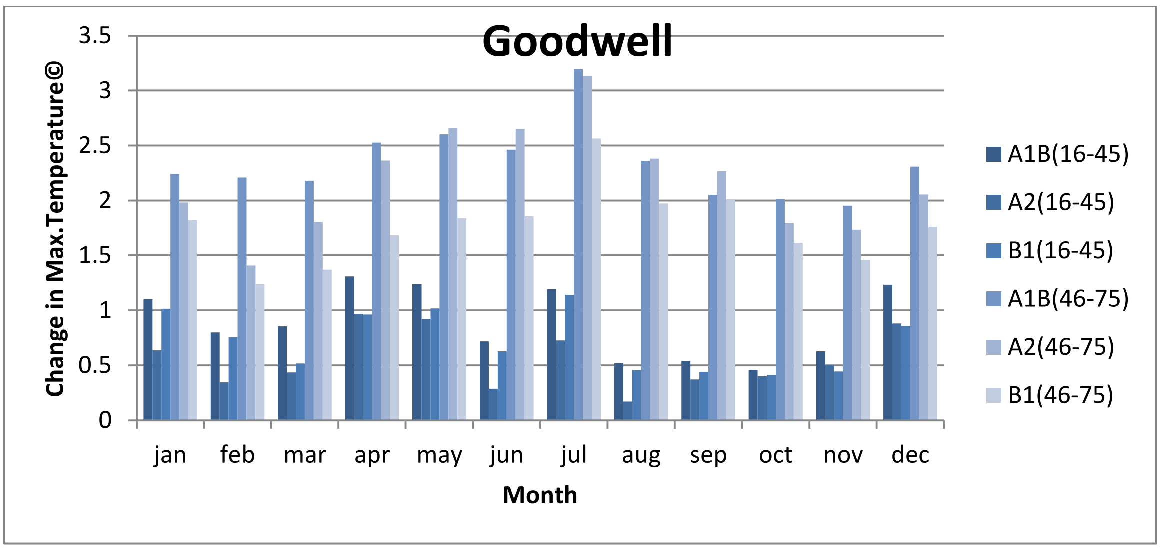
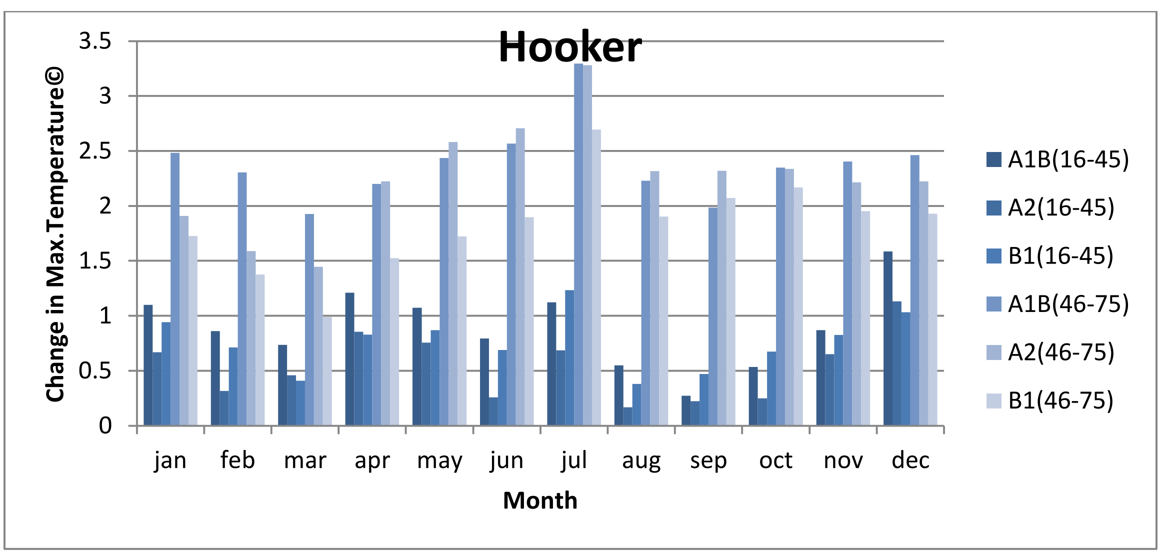
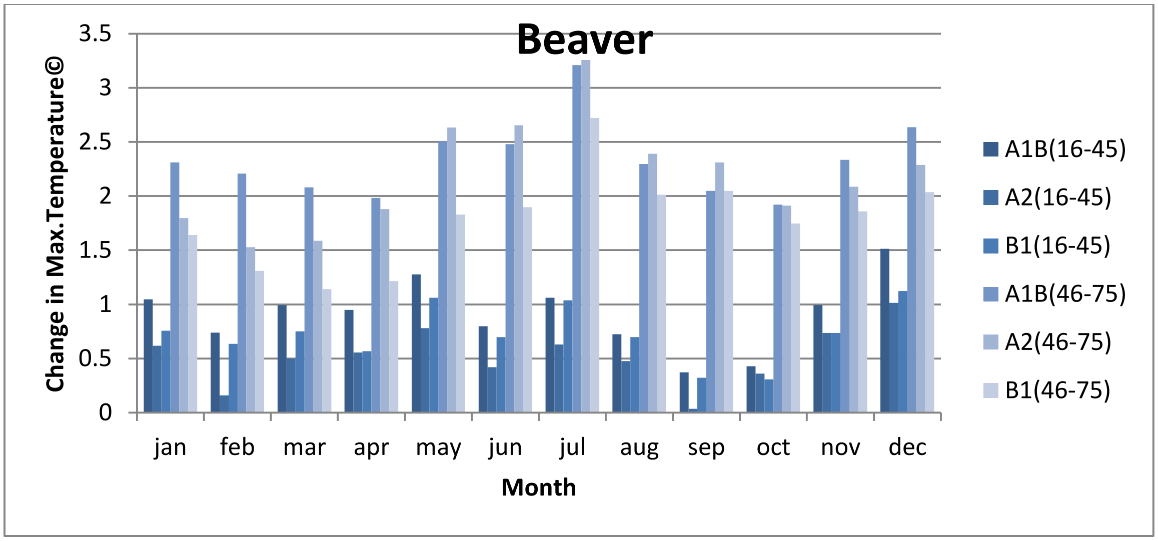


Figure (5-7) changes in rainfall Trend (mm)


Boise City
Change in Max.Temperature©
3.5
3
2.5
2
1.5
1
0.5
0
jan
feb
mar
apr
may
jun
jul
aug
sep
oct
nov
dec
Month
A1B(16-45)
A2(16-45)
B1(16-45)
A1B(46-75)
A2(46-75)
B1(46-75)


Goodwell
Change in Max.Temperature©
3.5
3
2.5
2
1.5
1
0.5
0
jan
feb
mar
apr
may
jun
jul
aug
sep
oct
nov
dec
Month
A1B(16-45)
A2(16-45)
B1(16-45)
A1B(46-75)
A2(46-75)
B1(46-75)


Hooker
Change in Max.Temperature©
3.5
3
2.5
2
1.5
1
0.5
0
jan
feb
mar
apr
may
jun
jul
aug
sep
oct
nov
dec
Month
A1B(16-45)
A2(16-45)
B1(16-45)
A1B(46-75)
A2(46-75)
B1(46-75)



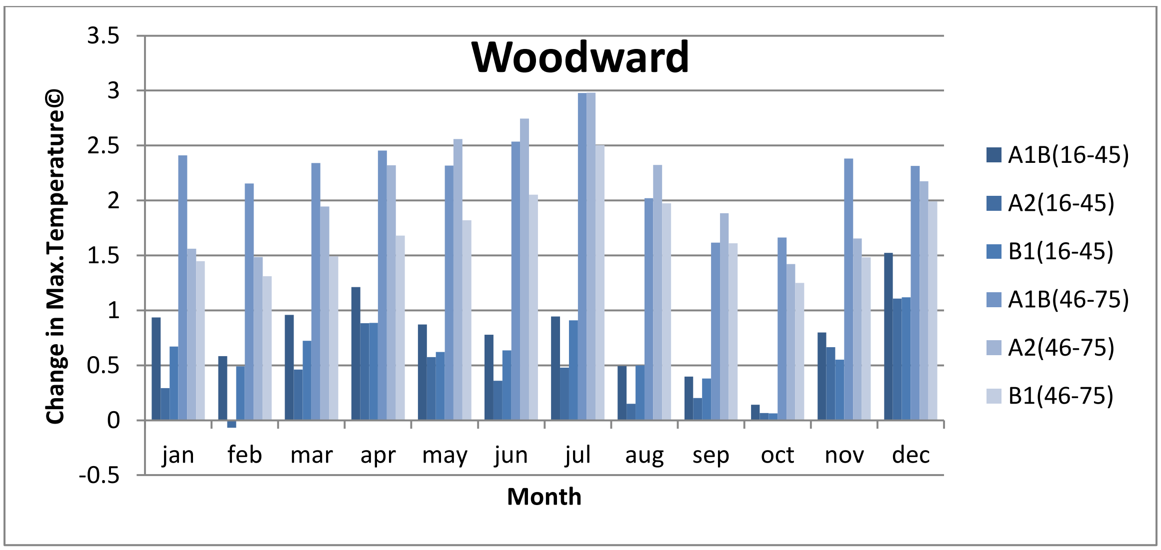
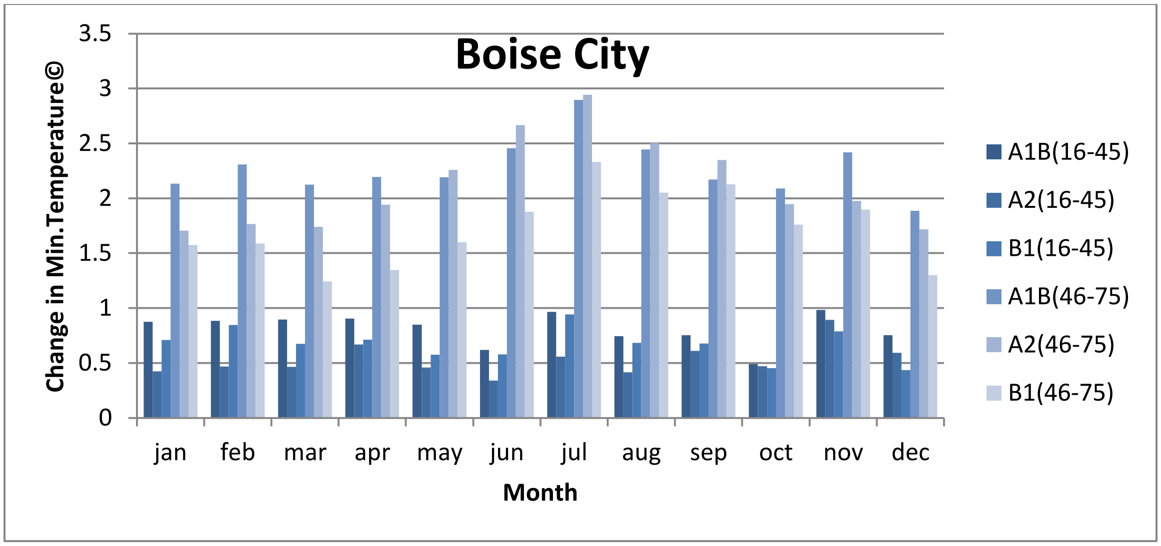
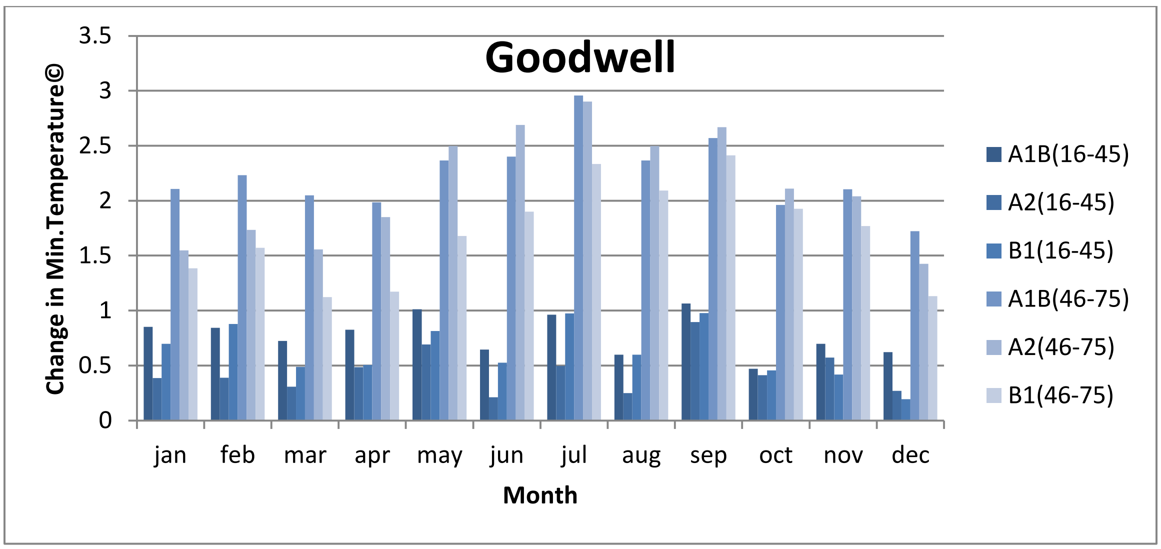
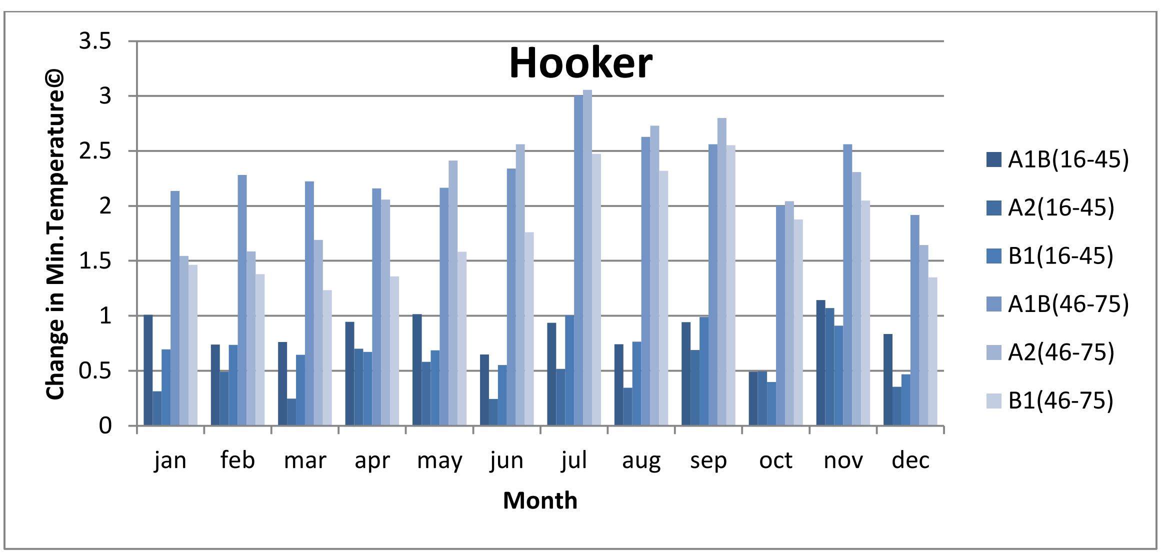
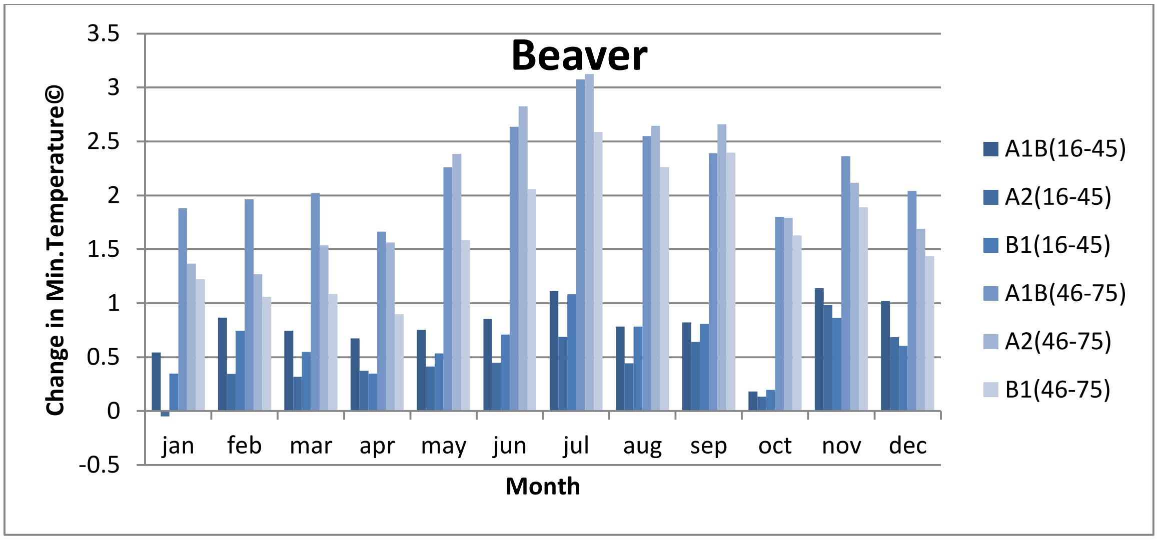


Figure (5-8) changes in Maximum temperature trend [℃]


Boise City
Change in Min.Temperature©
3.5
3
2.5
2
1.5
1
0.5
0
jan
feb
mar
apr
may
jun
jul
aug
sep
oct
nov
dec
Month
A1B(16-45)
A2(16-45)
B1(16-45)
A1B(46-75)
A2(46-75)
B1(46-75)


Goodwell
Change in Min.Temperature©
3.5
3
2.5
2
1.5
1
0.5
0
jan
feb
mar
apr
may
jun
jul
aug
sep
oct
nov
dec
Month
A1B(16-45)
A2(16-45)
B1(16-45)
A1B(46-75)
A2(46-75)
B1(46-75)


Hooker
Change in Min.Temperature©
3.5
3
2.5
2
1.5
1
0.5
0
jan
feb
mar
apr
may
jun
jul
aug
sep
oct
nov
dec
Month
A1B(16-45)
A2(16-45)
B1(16-45)
A1B(46-75)
A2(46-75)
B1(46-75)



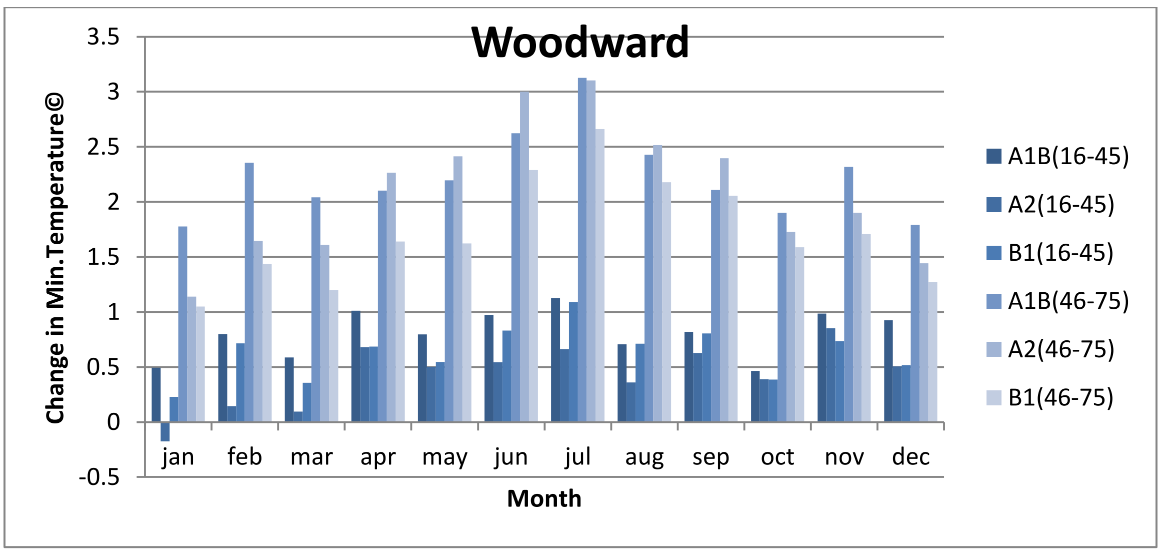


Figure (5-9) changes in Minimum temperature trend [°C]

Table 5-9 extreme changes in rain, minimum and maximum temperature in the future

parameter	2016-2045			2046-2075		
	amount	scenario	station	amount	scenario	station
maximum increase in RAIN	7.883265	B1	Goodwell	4.40	A1B	Goodwell
maximum decrease in RAIN	-3.99607	A1B	Beaver	-8.99	A2	Hooker
maximum increase in T-MIN	0.850459	A1B	Hooker	2.33	A1B	Hooker
maximum increase in T-MAX	0.907864	A1B	Beaver	2.39	A1B	Hooker

Results of HADCM3 model under A2, B1, and A1B scenarios show that rainfall distribution varies until the year 2075 but it will mostly be increasing also, minimum and maximum temperature will be increasing in all stations. .

As to table 5-9 highest increase in minimum and maximum temperature is 2.33 and 2.39 degree centigrade, respectively. This happens under A1B scenario in Hooker station within 2046-2075.

Also, highest increase in rain is 7.9% with B1 scenario in Goodwell station in 2016-2045. While, highest decrease in rain is about 9% under A2 scenario in Hooker station in 2046-2075.

5.3IHACRES model

In this step, for converting temperature and rainfall data to discharge, results from LARS-WG model are utilized as input data for IHACRES.

First daily rainfall (mm), temperature (degree Celsius) and observed daily discharge data (cumec)from past are given to the model then the model will be calibrated, after that ability of the model in simulating daily mean discharge is determined and then the IHACRES model is ready to project the Beaver River flow for the future periods of 2016-2045 and 2046-2075.

5.3.1 Calibration of IHACRES model

Initially a calibration and validation period needs to be define for the model. For this reason, data from 2007-2012 and 1988-1989 periods were selected for calibration and validation of the model respectively. After that the linear and non-linear module were identified. The non-linear (loss) module transforms rainfall into effective rainfall and the linear module transfers effective rainfall to stream flow. Next, the minimum (Start Value), maximum (Finish Value), and step size (Step Value) for each calibration period was set from the 5 parameters of The Classic model module and a box summarizing the linear and non-linear module parameter sets pops up that is given in figure 5-10.

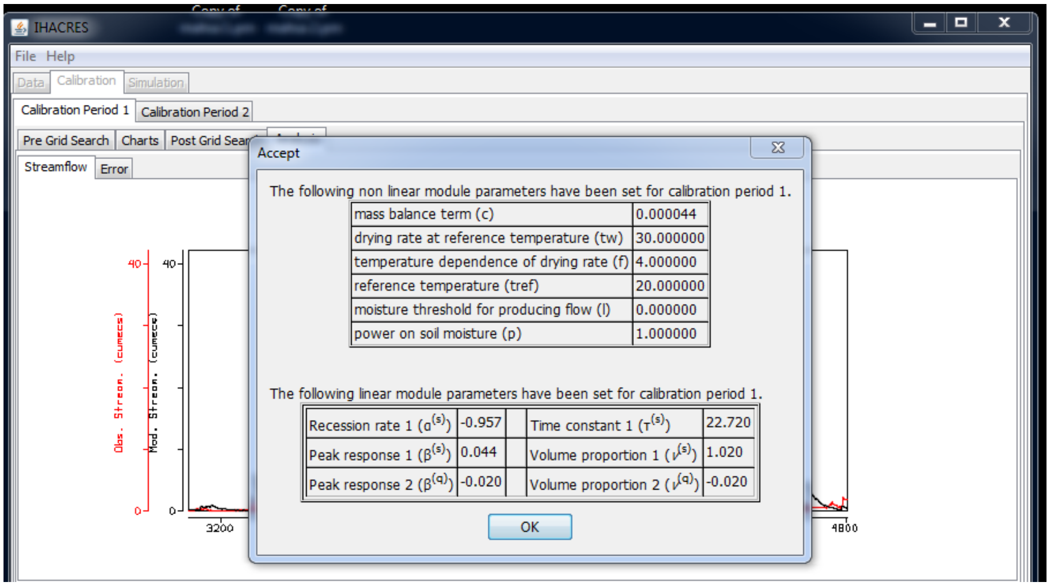


Figure (5-10) linear and non-linear module parameters

And then the model simulated the streamflow for 1985-2015 periods.

Fast and total assessment of the model is possible by comparing observed and simulated hydrographs. Accordingly, we can conclude that the model has a sufficient ability to simulate the data in this basin.

Also results from simulating flow in the calibration level were assessed with statistical criteria.

R Squared:

Is used for measuring of fit between observed and modeled streamflow

R Squared can be obtained using equation 5-1:

$$R^2 = \frac{\sum(Q_O - Q_M)^2}{\sum(Q_O - \overline{Q}_O)^2}$$

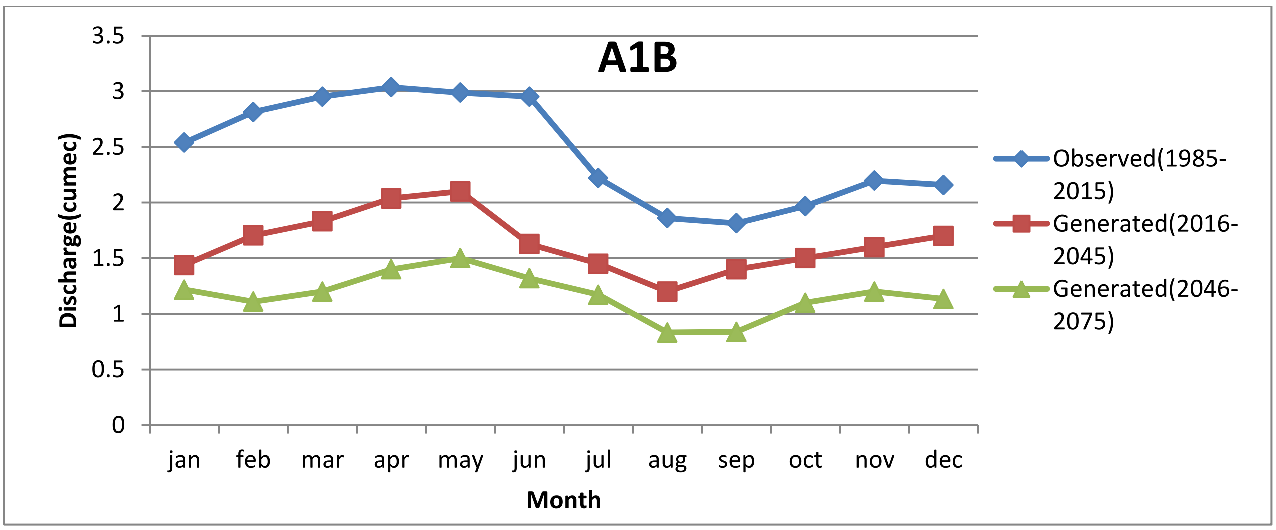
Calculated R Squared for this model

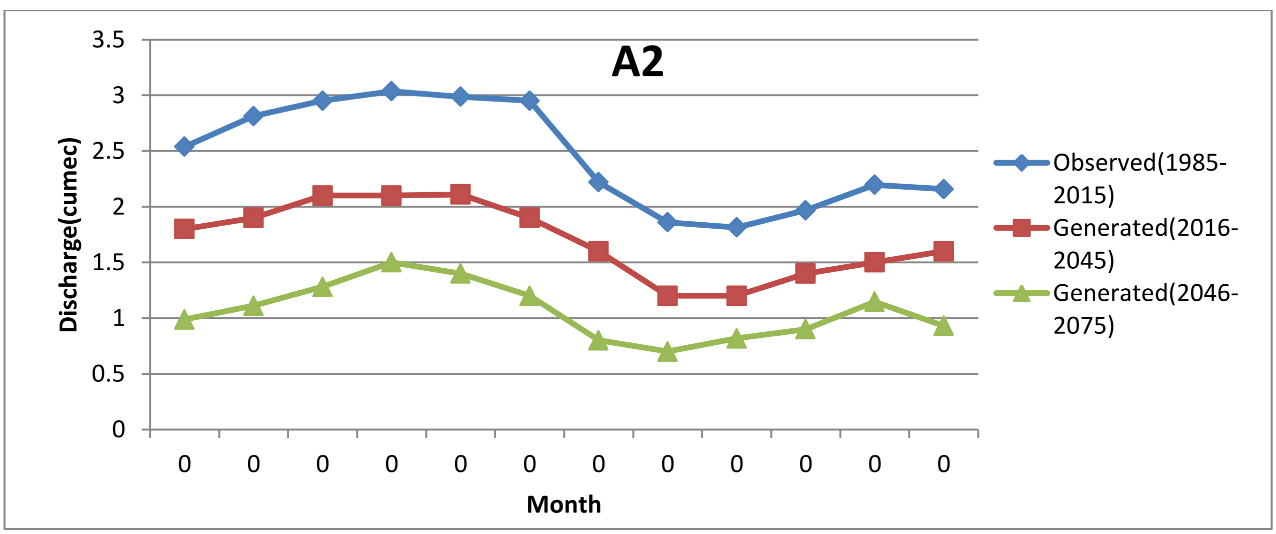
If $R^2 \geq 0.75$ the result is very good and if $0.75 \geq R^2 \geq 0.36$the result of simulation is acceptable.

Calculated R^2 for the model in this study was 0.897 that demonstrate the good ability of the IHACRES rain-runoff model.

5.3.2 Prediction of IHACRAS model

Results from modeling the river flow with IHACRES model under 3 Scenario A2, A1B and B1 for future is given in figure 5-11.





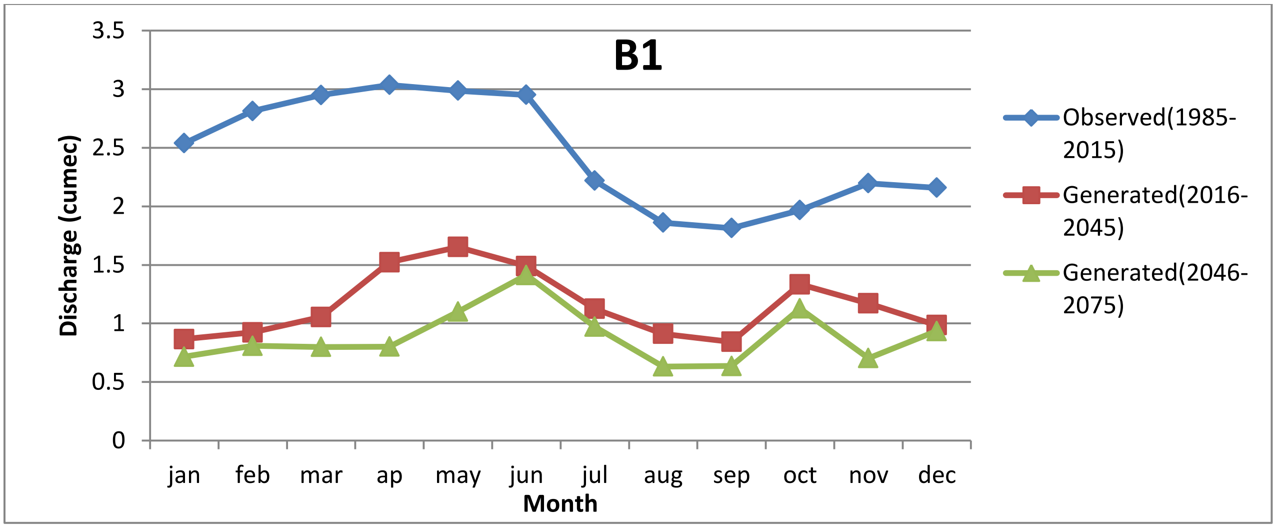


Figure (5-11) hydrographs with IHACRES model under A2, A1B and B1 scenarios (cumec)

According to the results from figure 5-11 it is concluded that discharge in Beaver River basin under A1B scenario will decrease until the year 2045 and this drop from January-June is more than June-December. And until the year 2075 it drops again but with a less reduction rate.

Under A2 scenario reduction in stream flow from 2016 until 2045 and from 2046 to 2075 is almost 50 percent.

Until the year 2045 reduction in discharge of Beaver River basin under B1 scenario is more than 50 percent and from that year till 2075 does not have a significant decrease.

Temperature incline and precipitation decline are 2 important parameters that cause reduction in river flow in this period.

It is also noticeable from figure 5-11 that under all 3 scenarios the river flow in warm months especially July, August and September reaches its lowest amount. The reason for this possibly is increase in temperature and increase in snow melting before getting to warm months.

CHAPTER VI

CONCLUSION

6.1 Conclusion

1. Regards to getting climate change trend in Beaver River basin Mann-Kendal test was used. Mann-Kendall yearly rainfall results shows decreasing trend in all stations except for Beaver that does not have any trend. Average temperature is increasing in Goodwell and Hooker during this period while no trend was found in other stations. Yearly results of the test show reduction in discharge in hydrometric stations. And monthly results for streamflow show either decreasing or no trend in most stations.

2. Results from LARS-WG (weather generator model) under A1B, B1 and A2 demonstrate that rain distribution has changed in all stations under three scenarios for future periods 2016-2045 and 2046-2075.

3. Results from LARS-WG for the future period 2016-2045 and 2046-2075 shows an increasing trend for maximum and minimum temperature in all the stations and under all scenarios. Highest increase in maximum temperature and minimum temperature is about 2.39 ℃ and 2.33 ℃ respectively.

4. It is concluded that discharge in Beaver River basin under A2, A1B and B1 scenarios will decrease by nearly 50% until the year 2075. Also reduction from 2015 to 2045 is more than 2046 to 2075. Temperature incline and precipitation decline are 2 important parameters that cause reduction in river flow in this period.

5. Also under all 3 scenarios the river flow in warm months especially July, August and September reaches its lowest amount. The reason for this possibly is increase in temperature and increase in snow melting before getting to warm months.

6. Based on the results from this study, climate change until 2075 will affect the discharge of the Beaver River and will change the runoff distribution in all the seasons.

6.2 Future Work

- In this study for assessing the impact of climate change on water resources, only HADCM3 model under A1B, B1 and A2 scenarios was used. To accomplish the studies, it is suggested to use other outputs of GCM model and compare the results with this research.

- In this study minimum and maximum temperature and rainfall was considered as the most effective climate parameters in river flow. It is recommended in future studies to consider the effect of other variables such as wind speed, air moisture and evaporation in predicting long term river flow.

- Considering that changes in seasonal rain causes change in soil moisture, change in river discharges, change in groundwater recharge and consequently causes change in water storage and quality, it is recommended to consider effect of climate change on water storage and quality in the future studies.

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APPENDIX A

This section contains input data used in this study and also output data from LARS-WG and IHACRES models for the future period 2016-2045.

Boise City Avg. Temperature[℃]												
year	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec
1985	-0.4	1.9	8.8	13.9	18.6	23.2	26	24.7	18.6	13.1	5.5	0.7
1986	6.5	4.4	11.1	15	17.3	22.8	25.8	23.7	19.6	13	6.6	2.7
1987	1.4	4.7	6.3	12	17.6	22.4	24.6	23.5	19.2	14.3	6.9	1.3
1988	-1.1	3	6.7	11.6	16.8	23.1	24.4	24.7	18.9	13.9	8.4	3.3
1989	3.9	-1.4	10.2	14	18.8	20.3	24.4	23.5	19.2	14.6	8.9	0.6
1990	2.2	2.5	7.1	12.9	16.2	25.6	23.8	24	21.5	14	9.4	-1
1991	0	5.6	7.9	12.7	19	22.7	24.3	23.8	19	14	5	2.8
1992	3.3	5.4	9	14.1	16.4	20.1	24.5	22.9	21.1	15.2	3.3	1.8
1993	-0.2	2.7	8.2	12	16.8	22.3	25.7	24	19.8	12.8	5.1	3.3
1994	2.4	2.8	8.5	12.1	18.2	25.4	25.3	25	20.6	13.9	6.4	4.2
1995	3.3	5.7	7.7	9.7	14.9	20.9	24.8	25.9	20.4	14.3	9.3	2.9
1996	2.2	4.7	5.9	13.3	20.3	23.5	24.5	23.4	18.6	13.5	6.2	3.3
1997	1.3	2.6	9.8	8.7	16.8	21.8	25.7	24.2	21.8	13	5.2	0.5
1998	2.2	4.1	4.8	10.2	19.5	23.3	26.2	23.5	23.3	15.2	8.9	2.5
1999	4	7	7.4	11.2	16.3	21.7	25.6	24.7	18.4	13.5	10.1	3.6
2000	3.5	8.4	7	13.3	20.3	22.6	25.9	26.6	22.9	13.8	3.3	0.1
2001	-0.5	2.7	6.4		16.9	22.8	27.6	24.6	21.3	14.4	8.9	3.6
2002	2.3	2.9	7	14.8		24.8	26.2	25.2	20.4	10.8	6.5	
2003	4.5	2	8.2	13.2	18.6	20.8	27.5	25.4	19.1	16.1	7	3.7
2004	2.7	2.3	10.4	11.9	19.6	22.1	23.4	22.4	21	13.8	5.8	3.8
2005	3.1	4.1	6.8	11.2	16.6	21.8	25.4	23.5	21.7	14.8	9.1	2.5
2006	5.3	3.4	7.5	15.6	19.1	24.7	25.4	24.1	16.9	13	8	1.5
2007	-3.7	1.9	10.5	10.6	17.1	21.4	24.7	26.3	21.2	15.2	7.6	0.7
2008	1.7	3.6	7.3	11.9	17.7	24.1	25.3	23.4	19.4	13.8	9.1	3
2009	3.2	5.5	8	11.6	17.1	22.9	25.1	24.2	19.2	11	8.4	-0.4
2010	1	-1.2	7.6	13.6	16	24.6	25.2	24.7	22.5	14.6	6.4	3.7
2011	1	1.4	8.5	13.8	16.8	25	28.2	27.2	20	13.9	7.6	-1.8
2012	4	3.3	11	15.1	18.9	24.9	26.8	24.9	20.5	12.9	9.5	2.2
2013	1	2.4	7.5	9.4	17.7	25	24.9	24.6	21.6	12.7	6.1	2.1
2014	2.6	3	7.7	12.2	17.8	23.2	24.9	24.4	20.6	14.6	5.7	2.8

Goodwell Avg. Temperature[°C]												
year	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec
1985	-1	0.7	8.2	14.1	18.3	22.4	26.1	25.1	19.7	12.3	4.5	0.1
1986	5.1	3.4	10.1	14.4	17.7	23.4	26.8	24.5	21.1	13	5.6	1.2
1987	0.9	5	5.5	11.7	17.6	22.5	24.6	24.4	19.4	13.2	6.8	0.6
1988	-2.2	2	5.8	10.4	16.3	23.5	24.9		19	13	7.8	3.1
1989	2.9	-2	8.3	13.9	18.2	20	24.7	24.4	18.6	14.5	7.8	-1.5
1990	1.8	2.2	6.8	11.9	16.5	25.9	25.3	25.2	22.4	13.5	9.2	-1.1
1991	-1.2	6.9	8.3	13.1	19.2	23	25.7	24.9	19.9	14.3	3.6	2
1992	3	5.6	9.2	13.4	17.9	21.1	24.4	22.6	21.1	14.5	3.6	-0.3
1993	-1.3	0.8	7.2	11.6	16.9	22.3	25.7	24.4	19.1	12	5.4	3.9
1994	1.3	1.4	7.6	12.3	18.4	26.2	25.9	25.8	20.9		7.3	4.9
1995	3	6.2	8.1	9.9	15.3	21.9	25.4	26.6	20.3	14.9	9.3	3.1
1996	0.9	4.6	5.1	13.5	20.7	24.6	25.3	23.7		13.9	6.6	2.3
1997	0.9	2.9	10	8.7	17.3	23	27.2	24.7	22.2	14.7	6.1	0.6
1998	2.4	4.5	4.3	11.4	21.8	25.3	27.6	25.1	24.3	15.7	4.9	3.1
1999	3.5	6.6	6.7	12.2	17	22.6	26.2	27.1	20.2	14	10.7	3.8
2000	3.2	7.9	8.2	12.8	19.5	23.2	27.2	28.1	22.4	14.9	4	-0.5
2001	-0.2	2.7	5.9	15.2	17.7	24.5	29.5	26.9	21.9	14.8	10	4.1
2002	2	2	6.1	14.8	19	26.4	26.5	26	20.8	10.9	7.1	0
2003	3.4	1.4	8.5			21.2	27.7	27.1	19.8	15.8	7	4.2
2004	2.7	2.3	11.2	13.1	20.4	23	24.3	22.8	21.6	14.6	6.4	3.3
2005	2.9	5	7	11.5	17.6	23.1	25.9	25.1	23	15	8.8	2.4
2006	5.7	3.2	8.3	16.3	20.2	25.3	27.2	25.2	18.4	13.7	7.9	2.1
2007	-1.9	1.9	11	10	17.8	22	25.6	27.7	22.5	16.1	7.7	0.5
2008	1.5	2.6	7.9	11.8	18.8	25.1	25.7	24.1	19.1	13.3	8.4	1.8
2009	2.2	6.2	8.4	12	17.1	24.1	26.3	24.8	19.5	10.4	8.8	-1.6
2010	0.2	-1.1	7.1	13.8	16.6	25.2	26.1	26.1	22.7	15.9	7.4	2.3
2011	0.4	0.7	8.7	13.7	17.9	26.4	29.4	28.2	21	14.6	7.8	-0.7
2012	4	2.8	12.3	15.3	19.9	25.9	27.7	25	20.7	12.4	8.6	2.1
2013	0.3	1.1	6.7	9.1	17.9	25.1	25.4	25.1	22.1	12.7	5.2	-0.1
2014	1.3	0.2	7.2	12.9	18.9	23.7	25.2	25.9	20.3	15.1	5.7	2.9

Hooker Avg. Temperature [℃]												
year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1985	-0.5	0.8	8.6	14.3	19.3	23	26.8	25.5	20.4	12.9	4.6	0.3
1986	5.4	3.2	10.4	14.5	18	24	27.3	24.6	21.4	13.3	5.9	1.6
1987	1.1	5.2	5.8	12.5	18.8	23.4	25.7	24.8	20.2	13.4	7.4	1.2
1988	-2.1	2.5	6.4	10.7	17.6	24.7	25.6	26.5	19.8	13.2	8.1	3.3
1989	3	-2.5	8.3	14.7	18.9	20.3	24.7	24.6	19.1	15.1	8.1	-1.5
1990	1.7	2.4	7.2	13.1	16.5	26.5	25.7	25.7	22.9	13.6	9.7	-1.2
1991	-1.3	6.9	8.5	13.4	19.3	23.5	25.7	25.2	20.2	14.4	3.3	2.6
1992	3.3	5.9	9.5	13.3	17.6	20.9	25.2	22.4	21	14.9	3.7	-0.7
1993	-2.6	0.4	6.6	11.3	17.6	22.7	26.4	25.4	19.3	12.6	4.2	3.1
1994	0.7	0.3	8.1	12.6	18.7	26.2	25.5	25.2	20.3	14.6	6.8	4.5
1995	2.3	5.8	6.9	10.4	14.7	21.6	25.1	27.4	20.4	14.1	7.8	1.2
1996	-0.2	3.5	4.3	12.8	20.2	24.4	24.1	23.8	18.9	13.8	5.9	1.4
1997	-0.1	2.7	9.1	8.9	16.8	22.8	26.1	24.07	18.47	14.5	4.6	0.2
1998	1.6	4.4	5.5	12.4	21.8	25.7	27.7	25.8	24.9	16.4	9.3	2.4
1999	3.5	7.7	7.2	12.8	18.4	23.1	27.5	27.2	20.5	14.7	11.1	4.6
2000	3.4	8.5	8.5	14.7	21.1	23.7	26.9	28.7	24	4.3		-0.2
2001	1.3	1.6	7.1	16	18.5	24.9	29.7	27.4	22.4	16.1	9.8	4.2
2002	2.6	4.1	7.3	16.1	19.7	26.6	27.3	26.7	21.9	11.4	7.4	1.3
2003	3.4	1.8	8.6	14.7	19.6	21.8	27.9	26.7	19.8	16.1	7	4.1
2004	2.8	3.1	11.7	13.4	21.3	23.6	25.1	23.2	22.1	14.8	6.5	4.7
2005	2.4	5.5	7.5	13.2	18.7	23.9	26.3	25.9	23.5	15.5	10.1	2.7
2006	6.8	3.7	8.9	17.2	20.9	26.2	27.4	25.5	19.3	14.1	8.7	2.8
2007	-0.9	2.7	12.1	11.7	18.8	22.5	26	27.8	23	17.2	7.6	1.3
2008	4.7	5.83	6.93	10.43	14.73	21.63	25.13	27.43		12.5	8.4	0.9
2009	2.8	5.7	7.5	11.3	17	23.8	26.7	25.6	19.3	10	9.2	-1.4
2010	-0.3	-0.3	7.1	13.8	17.7	26.3	27.4	26.8	23.6	15.8	7.9	2.5
2011	0.4	1.3	8	30.7	29.3	23.5	27.37	25.47	19.27	14.07	8.67	3.6
2012		3.68	8.88	17.18		27	32	24.6	21.8	13.4	9.5	2.2
2013	1.8	2.1	7.3	11.2	19.2	25.4	25.8	25.7	23.2	14	6.4	0.8
2014	1.8	2.8	6.4	13.7	19.4	24.4	25.6	26.6	22.1	17	9.17	0.9

Beaver Avg. Temperature [°C]												
year	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec
1985	-2.69	1.81	5.01	11.41	17.03	25.21	26.01	26.64	20.54	13.34	7.64	2.84
1986	1.87	5.57	7.17	10.97	14.87	20.97	25.37	27.57	20.77	13.8		
1987	1.1	3.17	3.77	12.97	21.57	24.77	26			13.9		0.9
1988	-2.7	1.8	5	11.4	17	25.2	26	26.6	20.5	13.3	7.6	2.8
1989	2.4	-2.6	8.4	15.3	19.4	20.9	25.1	24.4	19.3	14.7	7.1	-2.6
1990	2.7	3	7	13	16.9	26.3	25.8	26.3	23.1	13.5	9.1	-1.3
1991	-2.4	6.5	9	14.5	20.5	25.1	26.7	26.1	20.4	14.4	3	2.7
1992	2.8	6	9.7	11.3	17.9	21	25.2	22.8	21.5	14.8	3.2	-1.1
1993	-3.1	-0.1	6.4		18.5	22.5		26.2	19.6	12.6	3.9	2.5
1994	-0.3	0.7	8.1	12.8	19	26.7	26.2	26	20.8	15.6	7.1	4.4
1995	1.9	5.6	7.2	11	14.9	21	25.4	27.6	20.8	13.9	8	0.9
1996	-1	3.2	3.8	13	21.6	24.8	25.4	24.2	19.8	14.6	6	0.8
1997	0.3	2.2	3.9	9.9	17.1	22	27.3	25.2	22	14.6	5	-0.1
1998	0.8	4.5		11.4	20.5	24.8	27.9	25.3	23.9	15.6	8.8	1.4
1999	1.5	6.4	5.8	12	17.4	22	27.1	27	19.3	13.4	10.1	3.1
2000	1.6	6.5	7.2	12.3	19.4	22.9	27.9	29.3	23	15.5	3.4	-1.7
2001	0.2	1.2	5.5	15.3	19.1	24.7	30	27.4	21.8	14.1	9.6	3.7
2002	1.8	0.7	4.8	14.6	17.9	24.7	26.6	26.2	21.3	10.7	6.2	0.7
2003	1.7	0	7.2	14.2	18	21.3	28	26.9	18.6	0	0	2.9
2004	1.4	1.8	10.5	12.6	19.6	23	24	22.4	20.8	14.1	5.8	2.9
2005	1.5	4.6	7.4	12.4	17.6	22.8	24.9	24.4	22.2	14.3	7.9	1
2006	5	1.9	7.5	15.7	19.7	25.1	28	25.3	18	13.8	6.8	1.8
2007	-1.6	0.6	11.4	10.1	18.2	21.5	25.1	27.3	22.7	16.1	6.7	-1.2
2008	1.4	1.4	7.5	10.6	18	24.7	26	25	19.6	13.1	8.1	0.5
2009	0.7	5.5	6.9	12	17	24.4	26.4	24.9	19	10.6	8.8	-1.5
2010	-0.6	-1.8	6.5	14.5	17.6	25.1	26.5	26.7	23.2	16	6.6	1.1
2011	-0.7	0.2	8.2	13.5	18.1	26.5	30.5	28.9	20.1	14.1	6.6	-0.5
2012	3.3	3	12.6	15.3	21.1	25.9	28.9	25.2	21.7	12.9	8.7	1.8
2013	0.6	1.3	6.7	9.8	18.6	25.1	26.1	25.9	23.3	13.8	5.9	-0.7
2014	0.3	-2.5	5.6	12.8	18.5	23.8	25.4	26.9	21.2	15.6	5.3	2.6

Woodward Avg. Temperature[℃]												
year	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec
1985	3.2	1.8	7	13.2	18.06	23.06	24.06	22.86	18.06	12.66	8.96	
1986	4.4	1.9	8.1	13.1	18.5	20.7	27.4	25.3	19	16	6.9	3.6
1987	0.9	1.88	8.08	13.08	18.48	22.46	23.1	23.7	19.16	12.8	6.8	0.6
1988	-1.6	2.9	9.6		16.2	22.8	23.9	24.3	18.4	13.3	5.6	1.3
1989	2.3	-1.4	9.5	13.3	17.9	19.2	23.9	23.6	18.3	13.2	7.2	-1
1990	0.7	1.7	5.9	12.1	15.2	24.9	24	23.2	21.4	12.9	8.1	-1.7
1991	-0.5	5.3	7.6	11.8	18.1	23.1	24.1	22.9	18.1	12.7	9	-2.4
1992	2.6	5.6	8	14.5	17.2	20.6	23.2	22.3	20.2	12.4	3.1	1.1
1993	-1	0.5	7	11	17.6	22.5	25.7	23.4	19.2	12.3	4.5	1.9
1994	1	3.5	8.6	12	18.6	25.2	25	24.6	20.3	13.4	6.3	3.1
1995	3.1	5.3	7.8	10.5	14.9	21.3	25.1	27.1	19.5	14.1	9.2	3.1
1996	1.3	4.6	5.6	13.2	20.8	23.6	24.6	23.1	18.4	13.6	7	3
1997	0.9	2	9.6	8.4	16.9	22	25.6	23.7	21.3	13.9	4.9	0.9
1998	3.1	4.3	5.6	10.2	19.3	22.7	25.4	23.2	22.9	14.6	8.5	1.6
1999	3.9	6.8	7.3	10.9	16.6	21.8	25.4	24.4	18.6	12.8	9.7	2.7
2000	3.2	7.8	7.8	14.6	19.3	20.9	25.9	26.5	21.6	2.7	12.5	0.8
2001	-0.6	2.8	6.4	13.8	16.8	23.1	26.9	24.7	21	14.4	9.8	
2002	3.2	3.5	6.5	15.8	18.3	26.2	26.2	25.2	20.3	11.2	6	1
2003	3.4	4	7.7	12	21.6	28.7	28.4	26.7	19.6	19.3	2.2	2.4
2004	2	2	9.9	13	20	21	23.8	21.7	18.9	13.8	4.8	3.8
2005	6	3.2		14.5	5.6	26	26.5		18.2	13.6	8	2.5
2006	4.2	3.1	7.3	16.4	10.3	31	29.2	23.1	17.5	13	8.9	2.7
2007	1.8	3.7	7.4	12	17.8	24.2	25.4	23.5	19.5	13.9	9.2	3.1
2008	3.3	5.6	8.1	11.7	17.2	23	25.2	24.3	19.3	11.1	8.5	-0.3
2009	1.1	-1.1	7.7	13.7	16.1	24.7	25.3	24.8	22.6	14.7	6.5	3.8
2010	0.3	-1	7.2	13.9	16.7	25.3	26.2	26.2	22.8	16	7.5	2.4
2011	0.5	0.8	8.8	13.8	18	26.5	29.5	28.3	21.1	14.7	7.9	-0.6
2012	4.1	2.9	12.4	15.4	20	26	27.8	25.1	20.8	12.5	8.7	2.2
2013	0.4	1.2	6.8	9.2	18	25.2	25.5	25.2	22.2	12.8	5.3	0
2014	1.4	0.3	7.3	13	19	23.8	25.3	26	20.4	15.2	5.8	3

USGS 07232500 Beaver River near Guymon (cumec)												
YEAR	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1963	0.220	0.297	0.204	0.147	0.169	0.136	0.518	0.000	0.038	0.006	0.023	0.065
1964	0.194	0.250	0.178	0.135	0.067	10.486	0.399	0.074	0.006	0.024	0.236	0.286
1965	0.249	0.173	0.223	0.127	1.388	7.147	6.284	1.620	0.654	6.408	0.289	0.251
1966	0.197	0.374	0.251	0.203	0.100	0.236	3.087	0.254	0.988	0.117	0.185	0.219
1967	0.265	0.292	0.204	0.177	0.108	0.113	2.639	0.286	0.010	0.032	0.185	0.260
1968	0.176	0.294	0.326	0.144	0.501	2.495	0.016	0.001	0.360	0.360	0.142	0.153
1969	0.166	0.265	0.518	0.278	0.238	0.171	0.014	1.458	0.283	0.139	0.168	0.170
1970	0.225	0.233	0.210	0.345	0.118	0.023	0.000	0.021	0.000	0.035	0.113	0.139
1971	0.266	0.276	0.241	0.168	0.886	0.167	1.099	0.027	0.017	0.034	2.520	0.323
1972	0.238	0.219	0.179	0.139	1.866	0.223	0.032			0.005	0.187	0.221
1973	0.248	0.250	0.413	0.411	0.174	0.019	0.490	0.131	0.001	0.007	0.094	0.160
1974	0.180	0.180	0.264	0.103	0.023	0.583		0.572	0.097	0.074	0.117	0.132
1975	0.108	0.128	0.148	0.198	0.541	0.127	0.001	0.053	0.193	0.061	0.005	0.040
1976	0.057	0.076	0.158	2.509	0.521	0.213	0.001	0.000	0.222	0.073	0.025	0.077
1977	0.176	0.151	0.130	0.680	4.788	0.357	0.246	0.148	0.318	0.086	0.043	0.104
1978	0.113	0.150	0.167	0.099	1.422	2.110	0.013	0.161	0.394	0.098	0.128	0.017
1979	0.043	0.125	0.141	0.114	0.309	0.320	0.154	0.208	0.470	0.111	0.141	0.019
1980	0.081	0.140	0.152	0.173	0.215	0.200		0.256	0.546	0.123	0.153	0.067
1981		0.002	0.048	0.005	0.071	0.005	0.020	3.205	0.622	0.135	0.165	0.032
1982	0.065	0.109	0.074	0.027	0.014	0.115	0.977	0.091	0.698	0.148	0.178	0.088
1983	0.045	0.088	0.126	0.124	0.047	0.039	1.934	3.830	3.725	0.160	0.190	0.085
1984	0.025	0.072	0.021	0.081	0.071		2.892		2.753	0.173	0.203	0.082
1985	0.005	0.067	0.015	0.020	0.006	0.002	0.132	0.000	0.016	0.001	0.031	0.011
1986	0.023	0.025	0.038	0.009	0.329	0.340	0.174	0.228	0.490	0.131	0.161	0.039
1987	0.041	0.225	0.061	0.209	0.052	2.080	0.043	0.131	0.364	0.068	0.098	0.047
1988	0.059	0.425	0.085	0.409	0.062	2.090	0.053	0.141	1.557	0.008		0.007
1989	0.019	0.009	0.022	0.015	0.002	0.004	0.204	0.258	0.520	0.161	0.191	0.069
1990	0.219	0.007	0.027	0.026	0.018	0.000	0.033	0.181	0.414	0.118	0.148	0.037
1991	0.419	0.207	0.227	0.037	0.034		0.174	0.228	0.490	0.131	0.161	0.039
1992	1.019	0.407	0.427	0.048	0.050	0.039	0.000	0.276	0.566	0.143	0.173	0.087

USGS 07233000 Coldwater Creek near Hardesty (cumec)												
YEAR	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1940		0.046	0.060	0.138	4.358	1.640		0.283	0.530		0.128	0.054
1941	0.089	0.163	0.132	0.132	1.396	0.447	0.442	0.242	0.008	0.215	0.181	0.144
1942	0.182	0.140	0.213	0.614	0.172	1.201	0.213	0.006		0.541	0.080	0.161
1943	0.160	0.102	0.096	0.165	0.070	0.102	0.099	0.096	0.094	0.091	0.088	0.086
1944	0.297	0.194	0.168	0.230	1.277	0.044	0.501	0.295	0.196	0.098	0.001	0.100
1945	0.159	0.174	0.184	0.074	0.029	0.155	0.094	0.188		0.030	0.013	0.059
1946	0.074	0.108	0.105	0.054	0.266	0.035	1.855		0.055	17.695	0.620	0.267
1947	0.280	0.229	0.334	0.309	0.351	10.769	1.201	0.161	0.036	0.008	0.073	0.149
1948	0.139	0.292	0.365	0.133	0.079	0.241	0.091	0.263	0.027	0.016	0.176	0.157
1949	0.094	0.232	0.230	0.187	0.691	0.292	1.996	0.023	0.018	0.041	0.125	0.177
1950	0.150	0.200	0.162	0.165	0.106	0.036	9.987	3.072	6.391	1.209	0.208	0.244
1951	0.247	0.294	0.258	0.244	9.512	0.637	0.119	0.699	9.492	0.003	0.102	0.134
1952	0.129	0.157	0.227	0.175	0.075	0.001	0.328	0.046	0.055	0.021	0.122	0.007
1953	0.129	0.110	0.102	0.069	0.039	0.002	0.144		0.019	0.022	0.110	0.017
1954	0.115	0.075	0.067	0.084	0.146	0.053		0.063	0.126	0.033	0.099	
1955	0.004	0.048	0.068	0.072	4.647	2.953	0.883	0.166	4.627	2.933	0.025	0.089
1956	0.138	0.163	0.131	0.093	0.371	0.163	0.337	0.225	0.351	0.143	0.002	0.063
1957	0.141	0.157	0.396	0.281	0.592	1.994	0.141	1.371	0.572	1.974	0.118	0.142
1958	0.157	0.150	0.190	0.212	0.157	0.022	0.343	3.415	0.128	0.002	0.147	0.134
1959	0.278	0.241	0.180	0.170	0.328	0.303	1.846	0.104	0.308	0.283	0.040	0.086
1960	0.073	0.220	0.147	0.118	0.041	0.148	0.009	0.003	0.660	1.294	0.103	0.110
1961	0.086	0.145	0.229	0.198	0.368	0.309	0.116	0.003		0.006	0.089	0.114
1962	0.141	0.138	0.142	0.162	0.059	1.042	0.643	0.129	0.029	0.058	0.111	0.116
1963	0.067	0.135	0.126	0.097	0.079	0.286	0.297	0.005	0.269	0.111	0.004	0.069
1964	0.072	0.090	0.107	0.081	0.023	0.041	0.317	0.025	0.289	0.131	0.024	0.089

USGS 07233650 Palo Duro Creek at Range (cumec)												
year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1991										0.010	0.024	0.031
1992	0.042	0.042	0.038	0.038	0.039	0.040	0.024	0.010	0.004	0.013	0.028	0.032
1993	0.039	0.047	0.047	0.048	0.034	0.018	0.004	0.010	0.002	0.018	0.038	0.033
1994	0.041	0.042	0.053	0.049	0.041	0.027		0.008	0.015	0.003	0.008	0.012
1995	0.014	0.019	0.034	0.034	0.061	0.049	0.016	0.001	0.000	0.007	0.012	0.025
1996	0.023	0.024	0.032	0.027	0.014	0.002	0.004	0.016	0.042	0.028	0.045	0.076
1997	0.049	0.061	0.052	0.052	0.050	0.031	0.002	0.006	0.009	0.004	0.019	0.030
1998	0.040	0.045	0.056	0.051	0.039	0.006	0.000	0.002		0.012	0.039	0.027
1999	0.033	0.034	0.046	0.097	0.091	0.077	0.088	0.011	0.003	0.027	0.028	0.036
2000	0.035	0.037	0.040	0.037	0.035	0.017	0.004	0.001	0.000	0.004	0.015	0.024
2001	0.028	0.040	0.039	0.034	0.025	0.009	0.000	0.003	0.002	0.006	0.011	0.021
2002	0.021	0.018	0.011	0.010	0.013	0.008		0.004	0.001	0.011	0.036	0.053
2003	0.048	0.039	0.036	0.031	0.033	0.027	0.001	0.005	0.010	0.012	0.020	0.024
2004	0.027	0.033	0.033	0.036	0.039	0.007	0.007	0.006	0.001	0.019	0.022	0.028
2005	0.060	0.061	0.060	0.044	0.026	0.016	0.003	0.000	0.002	0.008	0.022	0.016
2006	0.013	0.015	0.020	0.027	0.031	0.000		0.003	0.004	0.008	0.012	0.028
2007	0.036	0.032	0.084	0.072	0.025	0.037	0.017	0.003	0.010	0.001	0.019	0.025
2008	0.020	0.028	0.029	0.027	0.012	0.000		0.001	0.004	0.010	0.015	0.023
2009	0.029	0.031	0.034	0.062	0.031	0.012	0.002	0.003	0.005	0.005	0.020	0.038
2010	0.029	0.028	0.025	0.022	0.009	0.963	0.098	0.005	0.001	0.000	0.026	0.052

USGS 07234000 Beaver River at Beaver (cumec)												
YEAR	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1985	0.002	0.005	0.234	0.736	1.215	1.150	0.000	0.092	1.373	3.681	0.257	0.151
1986	0.174	0.334	0.251	0.151	0.026	0.006	0.057			0.022	0.047	0.130
1987	0.116	0.214	0.603	0.535	2.554	2.883	0.963	0.027	1.770	0.481	0.328	0.388
1988	0.487	0.422	0.708	0.963	0.439	0.697	1.410	0.028	0.008	0.007	0.010	0.050
1989	0.099	0.159	0.200	0.143	8.365	10.259	1.393	0.530	0.479	0.154	0.229	0.272
1990	0.450	0.521	0.592	2.373	1.606	0.283	0.029	0.002	0.949	0.001	0.002	0.003
1991	0.005	0.005	0.047	0.062	0.637	0.192	0.002	0.000	1.419		0.004	0.005
1992	0.023	0.123	0.122	0.116	0.107	0.317	0.869	0.246	0.008	0.005	0.009	0.076
1993	0.238	0.606	0.782	0.436	1.042	0.276	0.074	0.007	0.005	0.004	0.006	0.005
1994	0.005	0.021	0.128	0.156	0.074	0.399	0.004	0.001	0.077	0.001	0.002	0.006
1995	0.015	0.067	0.122	0.180	1.322	0.561	0.174	0.007	0.003	0.006	0.006	0.006
1996	0.007	0.015	0.065	0.070	0.569	0.136	0.728	0.501	0.592	0.221	0.337	0.371
1997	0.328	0.425	0.422	0.748	0.481	0.223	0.057	0.038	0.003	0.005	0.008	0.044
1998	0.236	0.245	0.419	0.544	0.467	0.062	0.009	0.003	0.001	0.002	0.810	0.268
1999	0.265	0.399	0.600	0.974	1.747	1.523	0.360	0.061	0.012	0.089	0.099	0.130
2000	0.160	0.187	0.428	0.626	0.416	0.122	0.008	0.001	0.000	0.001	0.004	0.004
2001	0.004	0.016	0.153	0.176	0.149	0.022	0.000	0.081	0.032	0.109	0.119	0.150
2002	0.000	0.001	0.001	0.003	0.001	0.020		1.001	0.062	0.139	0.149	0.180
2003	0.000	0.000	0.001	0.001	0.001	0.001	0.000	0.101	0.052	0.129	0.139	0.170
2004			0.002	0.164	0.020	0.467	0.626	0.677	0.069	0.180	0.524	0.589
2005	0.685	0.949	0.699	0.467	0.229	0.229	0.025	0.033	0.008	0.005	0.017	0.026
2006	0.048	0.059	0.106	0.143	0.155	0.001	0.575	0.612	0.052	0.067	0.000	0.004
2007	0.317	0.317	0.595	1.110	0.388	0.177	0.027	0.000	0.000	0.000	0.001	0.001
2008	0.002	0.002	0.002	0.003	0.004	0.001	0.000		0.000	0.002	0.005	0.041
2009	0.068	0.093	0.056	0.697	0.252	0.034	0.003	0.001	0.001	0.001	0.001	0.001
2010	0.002	0.002	0.059	0.182	0.239	2.735	0.467	0.013	0.000	0.002	0.003	0.003
2011	0.028	0.077	0.110	0.108	0.073	0.000	0.057	0.030	0.040	0.050	0.021	0.031
2012		0.000	0.001	0.002	0.001	0.889	1.467	1.013	0.000	1.002	1.003	1.003
2013	0.098	0.123	0.086	0.727	0.282	0.064	0.033	0.402	0.000	0.001	0.002	0.000
2014	0.001	0.002	0.002	0.002	0.001	0.000	0.000	0.031	0.030	0.031	0.034	0.034

USGS 07234100 Clear Creek near Elmwood (cumec)												
YEAR	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1965										0.071	0.068	0.079
1966	0.079	0.077	0.068	0.042	0.039	0.026	0.026	0.031	0.629	0.041	0.050	0.056
1967	0.056	0.066	0.048	0.041	0.033	0.032	1.427	2.246	0.048	0.055	0.068	0.071
1968	0.074	0.077	0.075	0.052	0.099	3.480	0.089	1.218	0.109	5.454	0.125	0.093
1969	0.091	0.095	0.104	0.101	0.184	1.909	0.056	0.034	0.552	0.091	0.093	0.090
1970	0.090	0.084	0.086	0.082	0.051	0.074	0.035	0.501	0.054	0.052	0.072	0.070
1971	0.073	0.087	0.086	0.052	0.042	0.030	0.030	0.026	0.027	0.070	2.206	0.105
1972	0.087	0.089	0.063	0.044	0.077	0.046	0.340	1.979	0.137	0.067	0.082	0.080
1973	0.084	0.088	0.629	0.473	0.136	0.079	0.073	0.063	0.068	0.072	0.079	0.085
1974	0.087	0.081	0.086	0.073	0.035	0.039	0.027	0.051	0.044	0.061	0.110	0.093
1975	0.092	0.082	0.065	0.070	0.127	0.078	0.040	0.023	0.030	0.035	0.064	0.065
1976	0.067	0.077	0.079	0.253	0.087	0.063	0.026	0.018	0.087	0.076	0.091	0.099
1977	0.093	0.076	0.073	0.070	0.181	0.251	0.055	0.093	0.042	0.033	0.072	0.087
1978	0.078	0.082	0.076	0.059	0.170	0.405	0.028	0.835	0.036	0.050	0.055	0.057
1979	0.065	0.068	0.069	0.065	0.154	0.250	0.124	0.029	0.024	0.040	0.044	0.059
1980	0.058	0.056	0.091	0.067	0.057	0.139	0.026	0.022	0.009	0.046	0.048	0.059
1981	0.043	0.048	0.052	0.052	0.240	0.059	0.039	0.172	0.963	0.050	0.068	0.063
1982	0.057	0.076	0.112	0.075	0.247	0.552	1.764	0.067	0.052	0.057	0.065	0.064
1983	0.063	0.062	0.067	0.071	0.063	0.165	0.045	0.031	0.032	0.036	0.046	0.048
1984	0.052	0.051	0.052	0.064	0.066	0.064	0.036	0.032	0.020	0.039	0.064	0.080
1985	0.079	0.075	0.078	0.340	0.098	0.439	0.033	0.031	0.043	0.049	0.051	0.044
1986	0.050	0.055	0.052	0.057	0.056	0.061	0.162	0.057	0.034	0.056	0.063	0.057
1987	0.060	0.056	0.062	0.069	0.050	0.052	0.037	0.032	0.039	0.044	0.054	0.055
1988	0.050	0.052	0.067	0.080	0.072	0.077	0.123	0.029	0.035	0.046	0.055	0.056
1989	0.052	0.052	0.056	0.069	8.192	1.184	0.128	0.086	0.074	0.062	0.075	0.073
1990	0.064	0.069	0.070	0.098	0.066	0.046	0.034	0.142	0.046	0.031	0.046	0.054
1991	0.055	0.055	0.071	0.071	0.277	0.054	0.033	0.040	0.053	0.036	0.050	0.054
1992	0.058	0.051	0.051	0.070	0.039	0.032	2.285	0.044	0.032	0.032	0.060	0.059
1993	0.065	0.057	0.053	0.040	0.106	0.067	0.029	0.049	0.787			

USGS 07236000 Wolf Creek near Fargo (cumec)												
YEAR	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1946	1.110	1.198	1.260	0.793	0.527	0.105	0.665	0.405	1.883	3.203	1.957	1.220
1947	1.254	1.034	1.784	4.590	15.116	3.599	1.478	0.089	0.016	0.010	0.265	0.620
1948	0.654	1.334	2.206	2.231	0.745	2.648	0.872	2.033	0.224	0.131	1.198	0.841
1949	1.008	2.784	2.084	2.373	25.015	15.161	1.781	0.844	0.900	1.042	0.900	1.209
1950	1.422	1.444	1.065	0.818	7.436	2.246	34.745	17.925	8.458	2.078	1.801	2.127
1951	2.115	2.846	1.968	1.954	34.263	14.306	1.651	0.527	0.470	0.634	1.356	1.226
1952	1.512	1.671	1.940	2.138	1.736	0.360	0.161	0.009		0.005	0.234	0.496
1953	0.878	0.923	0.915	0.660	1.113	1.141	2.537	1.130	0.049	4.800	1.045	1.034
1954	1.161	1.042	0.852	0.759	3.659	0.929	0.008		0.000	0.025	0.020	0.173
1955	0.365	0.510	0.521	0.450	9.667	12.635	2.342	0.379	0.770	0.244	0.268	0.484
1956	0.589	0.745	0.694	0.515	0.697	0.280	0.699	1.150			0.006	0.075
1957	0.259	0.306	2.229	6.567	20.170	51.650	7.858	0.954	2.495	1.025	1.141	1.172
1958	1.288	1.334	1.546	1.277	1.195	2.206	2.747	4.460	0.473	0.191	0.510	0.609
1959	0.807	0.991	0.980	1.274	1.515	1.181	1.416	0.233	0.038	0.340	0.481	0.759
1960	0.875	2.537	1.634	1.515	1.053	3.115	2.384	2.897	1.419	1.246	0.906	1.119
1961	1.155	1.708	1.438	1.923	4.109	4.808	1.090	1.668	0.487	0.464	1.034	1.130
1962	1.087	1.274	1.138	1.339	0.595	2.291	0.490	0.462	2.121	0.682	0.779	1.119
1963	0.872	1.303	1.127	0.940	0.558	6.983	0.501	0.052	1.708	0.179	0.408	0.640
1964	0.920	1.218	0.932	0.821	0.657	1.390	0.153	0.277	0.014	0.115	0.994	1.096
1965	1.065	1.119	1.294	1.127	1.487	7.453	0.883	2.441	0.725	1.263	0.765	0.926
1966	0.753	1.226	1.189	1.189	0.688	4.834	0.580	0.745	0.702	0.345	0.580	0.725
1967	0.841	0.940	0.940	1.161	0.963	1.328	2.115	1.979	0.575	0.428	0.637	0.821
1968	0.909	1.065	1.062	0.900	1.317	1.269	0.521	2.347	0.600	3.627	1.189	0.949
1969	1.087	1.184	1.606	1.351	2.325	1.376	0.323	0.530	0.949	0.575	0.745	0.841
1970	0.864	0.934	1.000	1.424	0.841	0.866	0.215	0.096	1.062	0.612	0.702	0.773
1971	0.858	1.093	1.161	0.949	0.595	1.240	0.242	0.174	0.091	1.455	4.542	1.631
1972	1.325	1.186	1.048	0.909	1.405	1.056	0.498	0.402	0.643	0.268	0.609	0.733
1973	0.875	1.303	2.432	3.690	1.988	1.164	0.396	0.179	0.255	0.578	0.685	0.889
1974	0.934	1.002	2.333	1.155	0.872	0.368	0.076	1.195	0.685	0.532	0.736	0.779
1975	0.889	0.954	1.070	1.042	1.855	1.127	0.317	0.237	0.103	0.072	0.360	0.442

USGS 07237500 North Canadian River at Woodward (cumec)												
YEAR	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1985	0.422	1.189	2.676	2.243	5.975	2.407	0.875	0.561	0.997	10.667	4.887	3.531
1986	3.038	2.900	2.713	1.894	1.994	2.257	1.172	1.705	1.031	2.087	3.520	3.072
1987	3.256	4.927	11.426	10.016	7.292	9.849	5.989	1.543	2.424	4.298	2.611	3.259
1988	5.655	4.313	10.180	10.814	5.777	4.114	3.072	0.864	1.345	1.569	1.608	2.146
1989	2.370	2.880	3.138	3.259	17.760	23.039	9.294	5.862	4.466	2.883	3.041	3.064
1990	4.180	4.381	6.295	7.498	8.087	2.733	0.580	0.334	0.157	0.204	0.680	1.045
1991	1.708	1.634	2.061	1.648	1.218	1.637	0.174	0.049	0.052	0.066	0.264	0.379
1992	1.034	1.778	1.354	1.764	0.906	2.186	1.039	0.589	0.189	0.110	0.374	1.215
1993	1.974	3.183	4.672	4.282	8.396	3.438	2.472	0.654	0.348	0.200	0.328	0.391
1994	1.136	1.254	1.809	2.033	1.900	0.977	0.228	0.092	0.074	0.094	0.176	0.236
1995	0.405	0.600	1.467	1.640	2.093	4.222	1.563	0.623	0.174	0.171	0.226	0.428
1996	1.022	1.019	0.866	0.923	0.377	0.271	0.903	7.190	10.409	9.987	7.966	6.856
1997	4.599	5.397	5.168	8.172	9.665	9.820	2.860	2.246	1.671	1.818	2.458	3.415
1998	5.816	5.355	10.050	9.639	8.447	2.801	0.748	0.592	0.223	0.575	7.102	3.786
1999	3.840	5.864	5.989	16.308	17.041	13.153	7.674	2.087	1.195	1.376	1.722	2.696
2000	2.752	3.157	6.751	7.745	5.244	7.960	3.483	1.056	0.345	2.509	6.459	2.534
2001	3.540	6.966	7.461	6.589	8.617	5.241	1.478	0.430	0.445	0.377	0.937	1.062
2002	1.934	2.336	2.441	2.053	1.390	2.263	0.518	0.374	0.270	2.421	2.885	2.792
2003	3.239	3.322	4.095	3.548	2.430	3.262	1.076	0.507	0.631	0.507	0.479	0.830
2004	1.999	2.180	3.828	3.772	2.846	1.337	2.469	1.138	0.742	0.864	1.481	3.421
2005	5.819	6.176	4.635	4.760	2.673	8.220	4.021	1.354	1.897	0.864	1.345	1.659
2006	1.852	2.257	2.560	2.016	1.252	0.354	0.133	0.323	0.110	0.101	0.154	0.281
2007	0.331	1.249	1.917	11.083	8.577	20.382	6.128	1.770	0.850	0.459	0.782	2.127
2008	1.821	2.605	2.226	2.217	2.056	1.133	0.753	0.442	0.827	1.396	1.365	1.305
2009	1.886	1.611	1.662	5.326	7.498	2.039	0.816	0.532	0.300	0.368	0.479	0.532
2010	0.697	1.722	2.163	1.877	4.038	6.570	2.993	0.983	0.413	0.292	0.544	0.620
2011	0.937	1.334	1.654	0.988	0.382	0.159	0.144	0.110	0.051	0.062	0.102	0.190
2012	0.211	1.274	2.019	2.356	1.164	0.343	0.113	0.074	0.058	0.157	0.110	0.122
2013	0.177	0.278	0.487	0.379	0.317	0.326	0.286	0.442	0.188	0.116	0.142	0.145
2014	0.168	0.297	0.377	0.583	0.193	0.394	0.270	0.289	0.102	0.090	0.117	0.146

USGS 07238000 North Canadian River near Seiling (cumec)												
YEAR	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1985	1.317	2.127	4.038	3.639	8.866	3.540	1.668	1.178	1.674	12.182	7.450	5.069
1986	4.313	4.321	3.862	3.092	3.718	4.109	1.450	2.070	2.299	8.164	9.172	4.788
1987	5.196	8.501	16.056	12.553	13.029	11.729	7.286	1.671	3.528	5.004	3.772	4.955
1988	7.433	6.536	13.867	14.481	8.447	5.966	3.452	0.861	1.201	1.787	2.313	2.854
1989	3.058	3.407	4.035	4.126	17.505	27.807	10.763	7.677	6.909	4.058	4.171	4.508
1990	5.964	6.105	8.628	9.979	10.690	3.520	0.620	0.331	0.114	0.351	0.977	1.543
1991	2.172	2.288	2.534	2.013	1.838	2.563	0.230	0.069	0.345	0.077	0.926	1.212
1992	1.784	2.401	2.280	2.430	1.651	3.625	1.676	1.201	0.385	0.195	0.957	2.401
1993	3.497	4.480	5.791	5.536	20.482	6.666	3.704	0.985	0.564	0.501	0.977	1.235
1994	1.943	2.155	2.608	2.716	3.797	1.464	0.337	0.080	0.052	0.209	0.733	0.886
1995	1.206	1.376	2.577	2.662	4.066	17.185	2.956	2.599	0.784	0.957	1.014	1.365
1996	1.841	1.988	1.750	1.628	0.915	0.779	4.627	11.587	19.776	13.346	11.324	9.432
1997	6.564	7.813	7.917	14.813	16.580	16.143	3.398	3.101	9.863	4.301	4.655	7.192
1998	10.200	8.566	18.276	14.243	13.923	3.996	1.659	0.991	0.345	3.327	15.297	6.470
1999	6.187	8.461	9.820	31.941	19.675	15.237	8.603	3.089	1.637	1.911	2.568	4.046
2000	4.112	4.774	12.669	9.430	8.359	10.466	5.106	1.572	0.391	3.259	7.889	4.366
2001	5.678	10.191	10.412	8.886	15.093	7.439	2.115	0.609	2.410	1.036	1.747	2.172
2002	3.231	3.902	3.534	3.741	3.559	2.970	1.093	0.651	0.394	9.158	4.865	5.091
2003	5.123	5.120	5.913	5.227	6.728	4.910	1.430	0.439	0.648	1.014	1.136	1.580
2004	2.897	3.344	6.558	5.089	3.457	2.257	3.885	1.770	0.934	1.628	3.557	4.689
2005	7.572	8.266	6.737	6.162	3.894	11.695	4.485	1.543	1.858	1.450	1.906	2.478
2006	2.704	3.041	3.356	2.840	1.741	0.462	0.126	0.163	0.179	0.091	0.351	0.912
2007	1.322	1.869	2.801	11.681	12.658	24.098	11.188	2.849	1.623	1.076	1.455	3.174
2008	2.803	3.783	3.480	3.619	3.092	3.154	1.096	0.532	8.744	3.511	3.030	3.095
2009	3.474	3.030	3.310	10.347	10.030	3.302	1.048	0.620	0.411	1.308	1.481	1.603
2010	1.889	2.942	3.347	3.460	8.300	7.048	9.206	1.515	0.665	0.742	1.719	1.693
2011	1.954	2.288	2.741	2.073	1.102	0.521	0.146	0.002		0.030	0.118	0.578
2012	0.742	2.837	2.891	4.587	2.597	0.558	0.035		0.000	0.015	0.128	0.227
2013	0.600	0.830	2.033	1.625	1.436	0.719	1.266	1.608	0.572	0.490	0.527	0.731
2014	0.835	0.881	1.152	1.144	0.388	1.679	1.141	0.371	0.153	0.131	0.297	0.496

LARS-WG input (1 year average):

Boise City											
day	min T[℃]	max T[℃]	rain(mm)	day	min T[℃]	max T[℃]	rain(mm)	day	min T[℃]	max T[℃]	rain(mm)
1	-2.96	16.00	0.39	**45**	0.42	18.07	0.17	**89**	6.35	23.53	1.34
2	-3.44	15.27	0.34	**46**	-0.03	17.85	1.40	**90**	6.14	24.46	1.64
3	-2.84	14.17	0.46	**47**	-0.36	18.27	0.52	**91**	6.33	23.06	1.25
4	-3.25	13.98	1.30	**48**	0.74	18.75	0.01	**92**	6.13	24.50	0.32
5	-3.66	13.15	0.28	**49**	1.09	18.85	0.43	**93**	8.02	24.62	1.93
6	-4.55	12.76	0.42	**50**	1.91	19.72	0.81	**94**	8.38	25.79	1.89
7	-2.74	12.74	0.73	**51**	2.15	19.13	1.27	**95**	8.81	26.35	0.14
8	-3.40	12.25	0.43	**52**	2.85	20.12	0.37	**96**	8.68	26.13	1.20
9	-3.65	13.67	0.42	**53**	2.48	21.28	0.29	**97**	7.80	26.31	3.72
10	-4.02	15.50	0.25	**54**	2.89	20.67	0.08	**98**	8.05	26.46	1.08
11	-2.34	16.05	0.55	**55**	2.69	20.61	0.31	**99**	8.21	25.71	0.38
12	-3.46	14.07	0.59	**56**	2.89	21.11	0.84	**100**	8.82	26.22	1.15
13	-2.06	14.46	0.46	**57**	3.21	21.08	0.97	**101**	8.01	25.73	1.30
14	-2.81	13.81	1.78	**58**	2.37	20.67	0.15	**102**	8.18	25.26	2.04
15	-3.32	15.41	0.20	**59**	3.07	21.53	2.01	**103**	8.36	26.11	1.07
16	-1.96	15.85	0.72	**60**	3.13	21.83	0.35	**104**	8.93	27.53	0.42
17	-1.26	16.94	0.62	**61**	3.58	21.22	0.95	**105**	9.67	27.80	1.56
18	-0.96	15.22	0.90	**62**	2.50	20.12	0.66	**106**	9.71	27.73	0.76
19	-2.46	13.80	2.12	**63**	1.97	21.12	1.70	**107**	9.54	27.90	1.03
20	-2.88	14.35	0.35	**64**	3.69	22.65	2.22	**108**	9.64	26.86	1.50
21	-2.65	14.81	0.00	**65**	4.37	22.81	0.46	**109**	9.72	27.81	0.83
22	-1.98	17.29	0.34	**66**	3.87	21.06	2.50	**110**	9.94	28.19	1.16
23	-1.42	16.65	0.13	**67**	2.94	21.60	2.22	**111**	10.59	28.82	1.69
24	-1.84	16.05	0.19	**68**	3.54	22.20	1.64	**112**	11.37	29.02	0.56
25	-1.88	16.17	1.03	**69**	3.79	22.92	1.60	**113**	11.24	28.93	2.90
26	-0.79	17.11	0.22	**70**	4.64	23.37	0.60	**114**	11.11	28.05	1.79
27	-1.79	16.89	0.61	**71**	4.94	23.58	0.49	**115**	10.98	28.52	1.33
28	-1.75	15.72	0.09	**72**	4.79	21.88	0.45	**116**	10.34	28.16	2.68
29	-2.23	16.13	0.55	**73**	4.61	22.51	1.20	**117**	10.20	27.94	4.67
30	-1.42	15.26	1.79	**74**	4.60	22.72	1.08	**118**	9.68	26.55	2.71
31	-1.82	14.96	0.89	**75**	5.22	22.84	3.27	**119**	10.39	27.02	2.17
32	-3.05	14.46	0.26	**76**	5.90	22.55	2.52	**120**	10.06	25.69	1.48
33	-2.26	13.43	1.08	**77**	5.50	23.56	0.73	**121**	10.26	26.89	2.75
34	-3.53	14.09	0.46	**78**	5.38	23.69	0.83	**122**	10.50	26.61	3.03
35	-2.73	14.48	0.16	**79**	5.89	23.44	3.18	**123**	10.22	26.44	5.53
36	-2.59	15.11	0.13	**80**	5.29	22.57	0.45	**124**	10.62	28.39	3.96
37	-0.89	15.70	0.38	**81**	5.75	24.99	0.66	**125**	10.81	28.95	0.57
38	-0.37	17.23	0.29	**82**	6.27	25.98	0.09	**126**	11.78	29.89	0.57
39	0.09	18.15	0.46	**83**	6.87	24.67	1.38	**127**	12.49	29.70	0.45
40	-0.19	17.76	0.22	**84**	6.60	25.50	1.09	**128**	12.46	29.97	2.44
41	-0.99	18.26	0.36	**85**	6.63	25.27	1.51	**129**	12.00	30.12	0.67
42	-0.09	17.59	0.19	**86**	6.56	25.38	1.09	**130**	12.33	29.76	4.29
43	-0.39	17.30	0.68	**87**	6.27	23.78	0.13	**131**	12.87	29.38	3.99
44	0.01	19.30	0.54	**88**	5.98	23.91	0.81	**132**	12.35	29.58	0.08

Boise City											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
133	12.28	29.73	0.14	**177**	13.93	30.74	2.95	**221**	9.67	26.05	0.32
134	12.92	29.65	0.64	**178**	13.52	30.42	7.66	**222**	9.33	27.93	1.28
135	12.22	30.02	2.58	**179**	13.73	31.04	2.00	**223**	10.29	27.41	3.05
136	12.44	30.15	1.61	**180**	14.22	31.20	2.71	**224**	10.29	26.63	3.79
137	12.81	29.39	1.69	**181**	14.15	30.71	4.67	**225**	8.88	26.24	4.58
138	12.61	29.97	2.44	**182**	13.76	31.28	1.27	**226**	9.04	25.81	3.10
139	12.48	29.56	2.12	**183**	13.88	31.42	0.51	**227**	8.33	25.33	1.33
140	12.42	29.63	1.87	**184**	13.08	30.76	0.08	**228**	8.13	25.04	1.86
141	13.14	28.41	2.15	**185**	13.18	31.82	0.26	**229**	8.27	25.20	0.51
142	13.08	29.28	2.34	**186**	13.04	31.89	0.59	**230**	8.46	25.32	0.69
143	13.77	30.04	1.61	**187**	12.89	31.68	0.08	**231**	8.56	24.88	0.65
144	13.15	29.89	1.67	**188**	13.32	31.72	0.76	**232**	8.33	25.34	1.88
145	13.40	29.03	1.60	**189**	14.08	30.76	1.39	**233**	8.88	25.97	2.39
146	13.51	29.59	1.73	**190**	14.32	31.03	1.14	**234**	8.86	25.67	0.27
147	13.36	29.89	2.39	**191**	13.16	29.71	2.84	**235**	8.56	25.68	0.01
148	12.89	29.30	2.86	**192**	12.50	28.37	2.45	**236**	7.99	24.63	1.74
149	12.99	29.25	1.02	**193**	12.66	28.45	4.60	**237**	7.90	23.63	3.33
150	13.35	29.67	3.04	**194**	11.99	28.67	2.48	**238**	7.06	23.24	0.41
151	13.37	30.33	4.11	**195**	12.11	28.25	3.37	**239**	6.91	23.81	1.71
152	13.14	29.22	4.99	**196**	11.62	27.15	5.12	**240**	7.21	23.55	1.39
153	13.71	30.00	2.10	**197**	12.54	27.96	1.48	**241**	6.92	23.81	3.42
154	14.18	29.83	1.03	**198**	12.28	28.09	1.72	**242**	7.27	25.04	0.11
155	13.87	29.39	2.25	**199**	11.84	28.22	1.70	**243**	7.06	25.59	0.34
156	13.66	29.89	5.00	**200**	12.22	28.93	2.10	**244**	7.89	24.29	1.27
157	13.62	29.80	0.25	**201**	11.50	28.40	2.70	**245**	6.66	22.89	2.08
158	13.65	30.32	2.27	**202**	10.83	28.35	1.03	**246**	6.60	22.99	0.22
159	13.08	30.45	0.72	**203**	11.65	29.40	1.66	**247**	6.12	22.20	0.21
160	13.64	30.28	6.10	**204**	11.78	29.81	2.10	**248**	6.86	23.69	0.14
161	13.83	29.44	2.41	**205**	10.93	29.92	1.73	**249**	5.89	20.84	2.17
162	13.17	29.35	1.31	**206**	11.57	29.03	1.98	**250**	5.60	20.96	0.79
163	12.99	29.32	1.50	**207**	11.66	29.17	1.07	**251**	5.04	21.90	0.43
164	13.09	30.01	6.99	**208**	11.02	28.39	0.25	**252**	4.13	22.36	0.50
165	13.30	30.52	1.88	**209**	10.74	28.22	2.64	**253**	4.42	21.68	2.99
166	14.13	30.90	1.52	**210**	9.89	28.24	2.45	**254**	4.58	20.40	2.00
167	13.89	30.83	1.85	**211**	10.11	27.41	1.35	**255**	4.57	20.49	0.97
168	13.02	30.22	1.56	**212**	9.96	27.93	1.98	**256**	4.72	20.35	1.62
169	13.46	30.01	1.53	**213**	11.21	28.29	2.20	**257**	3.90	20.85	0.26
170	13.57	31.06	3.14	**214**	11.92	28.39	3.22	**258**	4.25	20.70	0.67
171	13.84	31.47	0.89	**215**	10.32	27.17	5.55	**259**	5.13	22.15	0.63
172	13.85	31.26	0.22	**216**	10.26	26.81	1.71	**260**	4.66	20.96	1.32
173	13.32	31.48	2.43	**217**	10.23	27.39	1.35	**261**	3.94	20.63	0.80
174	14.53	31.21	4.16	**218**	9.87	26.46	2.11	**262**	3.67	21.29	0.72
175	14.07	31.04	1.09	**219**	10.00	27.13	3.81	**263**	3.74	20.91	1.07
176	14.40	31.04	4.66	**220**	9.77	26.74	1.16	**264**	4.09	19.61	1.74

Boise City											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
265	2.50	18.86	0.68	**309**	-3.33	13.19	0.35	**353**	-4.40	13.80	0.63
266	2.07	18.28	0.76	**310**	-3.72	14.23	0.49	**354**	-3.55	13.30	0.64
267	2.05	19.63	0.65	**311**	-3.41	13.27	0.17	**355**	-4.52	12.31	0.16
268	1.94	18.83	0.54	**312**	-2.85	14.79	0.37	**356**	-4.89	11.38	1.01
269	1.38	18.12	0.71	**313**	-3.43	14.69	0.09	**357**	-4.64	10.87	0.71
270	1.28	18.94	0.05	**314**	-3.65	14.08	0.26	**358**	-5.46	10.42	1.41
271	0.50	18.91	1.15	**315**	-3.26	13.53	0.42	**359**	-4.50	12.41	2.97
272	0.24	16.99	0.26	**316**	-4.13	12.44	1.17	**360**	-4.29	13.46	0.13
273	1.58	18.44	0.04	**317**	-3.38	13.94	0.30	**361**	-3.54	14.34	0.10
274	1.48	19.40	0.72	**318**	-3.00	13.97	0.50	**362**	-3.14	13.98	0.63
275	1.75	19.98	1.73	**319**	-3.35	12.89	0.70	**363**	-3.20	14.42	0.47
276	2.28	20.19	2.14	**320**	-4.63	13.20	0.50	**364**	-3.38	14.03	0.09
277	0.87	19.02	0.24	**321**	-3.26	14.24	0.27	**365**	-3.75	15.42	0.46
278	1.22	18.32	0.24	**322**	-3.82	14.35	0.26				
279	1.29	18.88	0.08	**323**	-3.94	15.31	0.31				
280	1.47	18.21	0.22	**324**	-2.39	15.02	0.12				
281	0.80	18.47	1.11	**325**	-2.99	14.86	0.36				
282	-0.62	15.72	2.23	**326**	-3.72	13.23	0.60				
283	-0.66	16.83	1.16	**327**	-2.92	13.17	0.02				
284	-0.10	18.06	0.14	**328**	-3.69	13.95	0.47				
285	0.30	19.53	0.14	**329**	-4.46	13.69	0.45				
286	1.54	19.27	0.21	**330**	-4.58	10.88	0.12				
287	0.65	19.08	0.00	**331**	-5.96	11.02	0.27				
288	0.00	18.88	0.21	**332**	-5.79	11.54	0.01				
289	-0.10	19.42	0.47	**333**	-5.47	12.14	0.09				
290	0.76	18.12	0.47	**334**	-4.78	12.02	0.01				
291	0.41	16.81	0.20	**335**	-4.74	12.74	0.21				
292	-1.08	16.02	0.43	**336**	-5.05	13.37	0.28				
293	-1.13	16.59	1.46	**337**	-3.87	14.06	0.20				
294	-0.78	16.30	0.31	**338**	-2.83	15.30	0.51				
295	0.17	17.61	0.26	**339**	-3.43	13.64	0.87				
296	0.14	16.69	0.89	**340**	-3.46	13.76	0.83				
297	-0.83	17.48	0.59	**341**	-3.89	13.69	0.54				
298	-1.05	17.22	0.07	**342**	-3.49	13.21	0.13				
299	-0.35	17.35	0.68	**343**	-3.45	13.67	0.41				
300	-0.74	17.94	3.94	**344**	-4.32	13.85	0.79				
301	-1.50	16.67	0.06	**345**	-4.00	14.44	0.29				
302	-1.33	16.12	0.42	**346**	-2.84	14.56	0.47				
303	-1.87	15.13	0.78	**347**	-3.20	13.31	0.65				
304	-1.11	12.93	1.85	**348**	-3.76	13.78	0.31				
305	-2.67	14.11	0.77	**349**	-3.98	14.06	0.08				
306	-2.83	13.59	2.63	**350**	-4.10	13.00	0.50				
307	-3.06	13.30	3.48	**351**	-3.25	13.65	0.37				
308	-3.46	12.79	0.01	**352**	-4.52	13.18	0.63				

Goodwell											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
1	0.51	15.54	1.01	**45**	9.18	26.46	0.35	**89**	8.39	24.94	0.68
2	0.19	17.37	1.30	**46**	8.48	27.15	2.49	**90**	9.31	23.93	2.24
3	1.45	16.76	0.11	**47**	9.28	27.19	1.60	**91**	8.03	23.75	1.55
4	0.47	16.82	0.90	**48**	8.55	25.52	0.59	**92**	9.37	25.47	1.85
5	1.02	16.63	0.54	**49**	8.93	24.91	0.55	**93**	8.11	25.21	5.69
6	1.29	16.45	0.63	**50**	8.75	25.63	0.76	**94**	9.13	23.93	0.64
7	0.00	16.32	0.39	**51**	8.35	25.69	0.48	**95**	7.79	23.57	1.40
8	0.28	15.13	1.62	**52**	8.93	25.10	0.65	**96**	7.62	23.38	2.12
9	-0.18	13.77	0.75	**53**	8.56	25.18	1.01	**97**	7.88	25.39	0.98
10	-1.03	14.01	0.33	**54**	8.30	25.11	0.03	**98**	8.60	25.85	1.37
11	0.38	15.25	2.10	**55**	9.26	25.61	2.41	**99**	9.27	26.26	1.57
12	0.44	17.47	0.56	**56**	8.63	25.24	0.04	**100**	9.30	26.56	0.60
13	1.16	17.30	1.81	**57**	8.47	24.51	1.50	**101**	9.61	26.49	0.15
14	1.91	18.77	0.08	**58**	8.83	23.44	1.24	**102**	10.05	26.33	0.95
15	2.60	18.53	0.42	**59**	8.61	24.67	1.45	**103**	8.59	26.74	0.41
16	2.16	19.69	3.25	**60**	8.69	23.91	0.70	**104**	9.26	27.95	0.39
17	2.25	18.41	0.42	**61**	8.79	25.55	0.88	**105**	9.11	26.74	1.63
18	3.18	19.96	0.06	**62**	9.59	26.28	0.88	**106**	8.93	26.84	1.30
19	2.30	18.09	0.77	**63**	8.69	24.76	1.50	**107**	8.42	25.28	1.17
20	1.00	17.71	6.07	**64**	7.85	24.31	1.84	**108**	8.36	26.29	2.68
21	0.52	17.31	1.19	**65**	8.57	25.73	1.46	**109**	8.89	26.22	1.36
22	1.28	16.53	0.73	**66**	8.56	26.05	0.72	**110**	8.90	26.76	0.45
23	2.17	17.70	0.17	**67**	8.64	25.58	1.59	**111**	8.88	25.94	0.22
24	2.25	18.99	2.42	**68**	8.58	24.86	0.32	**112**	8.81	26.89	3.20
25	2.71	17.70	0.20	**69**	8.95	24.67	0.96	**113**	9.04	26.35	2.06
26	1.84	18.01	4.97	**70**	9.12	25.89	0.58	**114**	8.50	26.65	0.60
27	1.73	17.39	1.13	**71**	9.30	25.61	0.95	**115**	7.88	24.94	1.31
28	1.77	18.73	0.05	**72**	8.39	26.15	0.12	**116**	8.30	24.89	1.70
29	3.70	17.38	0.63	**73**	8.19	26.67	1.75	**117**	8.26	25.62	1.47
30	3.69	18.93	3.26	**74**	9.29	26.12	0.54	**118**	8.56	25.44	1.02
31	2.78	18.46	1.14	**75**	9.60	26.61	2.90	**119**	8.31	25.76	3.19
32	2.13	17.69	0.27	**76**	9.21	26.82	2.17	**120**	7.07	23.65	3.12
33	1.72	19.34	0.79	**77**	9.13	26.08	1.08	**121**	7.97	23.60	0.47
34	1.87	17.59	1.26	**78**	8.52	24.79	0.61	**122**	8.55	25.26	2.20
35	2.64	17.60	0.57	**79**	9.42	26.21	1.89	**123**	9.31	26.54	1.48
36	3.49	17.56	1.71	**80**	8.63	26.24	0.67	**124**	9.35	24.88	2.83
37	2.78	16.78	0.36	**81**	9.15	27.17	0.20	**125**	8.40	24.36	1.82
38	2.88	18.40	1.93	**82**	8.64	28.05	0.58	**126**	7.83	24.33	1.76
39	3.14	18.81	0.80	**83**	9.44	26.15	1.03	**127**	7.75	24.42	2.00
40	2.76	20.02	0.95	**84**	9.59	26.52	0.50	**128**	8.21	24.87	1.36
41	3.02	18.76	0.46	**85**	9.31	27.52	1.51	**129**	7.72	24.79	2.35
42	2.47	18.70	0.20	**86**	8.94	27.03	0.13	**130**	7.93	23.63	3.65
43	3.80	21.63	0.32	**87**	9.11	27.53	2.00	**131**	7.92	23.43	3.56
44	3.87	21.97	0.77	**88**	9.28	25.45	0.58	**132**	8.51	24.55	2.75

Goodwell											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
133	9.72	24.71	0.55	**177**	5.65	21.82	0.74	**221**	3.74	21.48	1.74
134	8.77	25.13	1.65	**178**	5.59	21.09	1.40	**222**	2.52	18.77	0.33
135	7.44	24.78	1.58	**179**	6.13	21.76	0.10	**223**	2.62	18.20	0.23
136	7.52	23.89	0.08	**180**	5.84	22.66	0.44	**224**	3.55	20.08	1.96
137	7.99	25.63	0.76	**181**	5.61	20.38	0.92	**225**	3.35	18.96	0.73
138	8.13	25.65	1.19	**182**	5.64	22.07	5.58	**226**	3.45	19.37	0.15
139	6.74	24.74	1.78	**183**	5.62	22.21	2.54	**227**	1.61	18.20	1.04
140	8.00	25.54	1.94	**184**	6.13	21.48	1.17	**228**	1.81	18.01	0.79
141	7.57	24.83	1.46	**185**	5.33	22.54	1.01	**229**	2.74	17.11	0.10
142	7.71	24.24	5.14	**186**	5.23	23.78	0.48	**230**	1.80	19.81	0.26
143	7.49	22.94	1.92	**187**	4.65	20.93	1.41	**231**	2.59	20.45	0.14
144	6.29	21.23	0.99	**188**	5.10	22.75	0.01	**232**	1.61	19.51	0.71
145	5.91	20.46	0.64	**189**	4.71	22.04	1.09	**233**	2.38	19.58	0.34
146	6.44	23.23	1.44	**190**	4.55	20.57	0.19	**234**	2.51	20.02	0.75
147	6.96	24.33	1.24	**191**	4.89	21.54	0.08	**235**	2.60	21.39	0.76
148	6.77	23.83	0.76	**192**	4.55	20.05	0.35	**236**	1.75	19.69	0.23
149	6.87	23.38	0.21	**193**	3.79	21.52	0.25	**237**	1.56	18.06	0.50
150	7.33	23.86	1.22	**194**	5.28	22.68	0.45	**238**	1.44	18.60	3.12
151	6.92	24.30	0.59	**195**	6.31	23.09	0.98	**239**	2.10	20.22	0.61
152	7.38	22.80	2.46	**196**	6.11	22.96	4.24	**240**	2.75	20.63	0.14
153	7.33	22.57	1.85	**197**	4.95	21.53	1.57	**241**	3.14	20.98	0.31
154	7.72	23.32	1.41	**198**	4.72	21.88	2.08	**242**	3.61	21.68	0.85
155	6.39	21.44	1.59	**199**	4.88	22.49	0.23	**243**	3.84	20.55	0.41
156	6.85	21.79	1.16	**200**	4.37	21.99	1.39	**244**	3.44	20.85	0.26
157	7.00	23.44	0.05	**201**	4.60	21.63	1.75	**245**	1.92	20.40	0.06
158	8.35	25.66	0.20	**202**	3.90	19.39	2.05	**246**	1.21	18.44	0.31
159	6.88	22.96	0.85	**203**	3.72	18.65	1.47	**247**	1.29	18.79	0.15
160	6.67	23.13	1.90	**204**	3.45	19.87	0.11	**248**	0.79	16.84	0.91
161	6.64	22.52	1.76	**205**	3.58	19.94	0.83	**249**	0.86	16.85	0.39
162	7.09	23.04	1.55	**206**	3.68	19.60	0.92	**250**	0.63	17.98	1.09
163	6.39	21.55	1.94	**207**	3.67	18.75	0.39	**251**	1.15	17.91	1.31
164	5.86	21.59	3.54	**208**	3.51	20.15	0.79	**252**	1.17	16.92	0.34
165	6.80	22.50	0.51	**209**	3.18	19.24	0.73	**253**	1.88	18.91	0.08
166	6.21	21.83	1.88	**210**	4.14	20.04	1.32	**254**	0.44	19.16	0.66
167	6.52	21.69	0.25	**211**	4.07	20.78	0.36	**255**	1.70	19.78	3.82
168	5.33	21.24	0.33	**212**	3.48	20.40	2.11	**256**	1.93	20.24	0.21
169	5.59	22.10	1.38	**213**	3.57	20.22	1.02	**257**	2.64	20.50	0.28
170	5.94	22.61	1.16	**214**	3.72	18.94	2.59	**258**	2.58	19.73	1.33
171	5.36	21.86	0.70	**215**	3.60	18.74	1.52	**259**	1.54	19.52	0.06
172	5.97	21.68	2.79	**216**	3.56	20.08	1.15	**260**	2.24	18.72	0.73
173	5.11	22.11	4.21	**217**	2.32	18.45	0.13	**261**	0.83	18.35	1.57
174	6.19	22.26	0.35	**218**	2.78	20.52	0.19	**262**	-0.19	16.02	2.09
175	6.92	23.13	0.44	**219**	3.79	20.46	0.73	**263**	0.37	16.38	0.97
176	6.32	22.91	2.37	**220**	3.63	20.79	0.47	**264**	-0.41	16.29	1.09

Goodwell											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
265	0.77	17.80	0.40	**310**	0.73	17.09	0.06	**355**	5.59	22.86	1.47
266	1.74	18.68	0.52	**311**	1.64	16.04	1.78	**356**	5.57	21.82	0.13
267	2.04	20.64	0.05	**312**	1.97	18.32	2.15	**357**	6.51	23.21	1.05
268	1.00	20.66	0.03	**313**	1.87	18.58	0.55	**358**	6.11	24.01	1.05
269	0.22	17.81	0.00	**314**	2.52	19.05	1.36	**359**	5.86	22.99	0.02
270	1.36	19.85	0.00	**315**	2.47	19.56	1.27	**360**	5.99	22.70	2.14
271	0.23	19.03	0.98	**316**	3.39	20.80	0.42	**361**	5.66	22.63	1.30
272	0.50	18.03	1.94	**317**	4.00	20.49	0.22	**362**	5.76	22.00	0.54
273	-1.01	16.15	0.14	**318**	2.90	20.41	0.22	**363**	5.98	20.81	0.80
274	0.62	15.63	0.28	**319**	3.31	21.02	0.39	**364**	5.64	22.35	0.40
275	1.77	19.06	0.00	**320**	2.44	19.52	0.38	**365**	6.19	22.63	1.48
276	0.61	17.48	0.25	**321**	3.28	19.15	1.96				
277	-0.50	16.61	1.64	**322**	2.18	19.37	0.27				
278	-0.28	17.41	1.22	**323**	1.94	17.74	0.90				
279	-0.14	16.31	0.78	**324**	1.99	19.34	1.14				
280	0.02	16.27	0.39	**325**	1.99	18.11	0.85				
281	0.22	17.35	0.37	**326**	1.74	17.01	1.60				
282	0.22	17.63	1.38	**327**	1.90	16.82	1.95				
283	0.54	14.70	2.86	**328**	2.05	18.00	0.80				
284	-0.55	16.42	0.22	**329**	3.11	19.74	2.02				
285	0.10	17.79	0.20	**330**	3.22	20.35	1.62				
286	1.17	16.91	0.57	**331**	3.42	20.21	1.73				
287	1.00	18.46	1.68	**332**	3.65	20.04	0.05				
288	1.35	18.19	0.20	**333**	3.05	20.31	0.73				
289	1.64	18.60	0.86	**334**	2.87	19.89	0.21				
290	0.08	16.49	1.36	**335**	2.37	20.09	0.54				
291	-0.76	14.31	0.79	**336**	2.48	20.43	0.65				
292	0.93	17.31	0.47	**337**	2.59	20.17	0.81				
293	0.83	18.34	0.53	**338**	4.60	21.31	0.43				
294	0.81	16.37	1.13	**339**	5.07	21.96	2.13				
295	0.59	17.11	2.18	**340**	5.48	21.93	1.68				
296	1.42	17.57	0.20	**341**	4.63	21.13	1.86				
297	1.19	15.23	0.81	**342**	4.87	19.87	0.53				
298	0.18	16.56	0.19	**343**	4.41	20.06	1.43				
299	-0.53	16.11	0.70	**344**	4.09	19.03	1.03				
300	0.46	16.34	0.33	**345**	3.85	19.63	2.42				
301	0.96	18.22	0.58	**346**	4.65	21.32	1.01				
302	1.72	17.63	0.55	**347**	4.54	19.70	1.93				
303	1.65	18.26	1.00	**348**	3.97	20.45	2.22				
304	1.27	18.68	1.42	**349**	3.97	21.11	3.05				
305	1.32	18.57	1.17	**350**	4.64	21.07	0.09				
306	1.76	18.52	1.26	**351**	4.39	19.15	1.67				
307	0.88	18.22	0.15	**352**	4.27	20.00	0.63				
308	0.81	17.43	0.69	**353**	5.55	21.05	0.99				
309	1.37	18.37	1.53	**354**	5.55	21.82	1.69				

Hooker											
day	min T[℃]	max T[℃]	rain(mm)	day	min T[℃]	max T[℃]	rain(mm)	day	min T[℃]	max T[℃]	rain(mm)
1	0.51	15.54	1.01	**45**	5.53	20.60	0.42	**89**	8.10	22.41	0.98
2	0.19	17.37	1.30	**46**	4.70	20.25	2.55	**90**	7.29	21.86	1.38
3	1.45	16.76	0.11	**47**	5.23	21.54	1.21	**91**	7.47	22.68	1.00
4	0.47	16.82	0.90	**48**	5.36	21.14	2.02	**92**	8.33	23.04	0.68
5	1.02	16.63	0.54	**49**	4.57	20.42	1.41	**93**	7.45	24.36	1.80
6	1.29	16.45	0.63	**50**	4.89	20.96	0.82	**94**	7.61	23.67	2.06
7	0.00	16.32	0.39	**51**	4.07	21.38	0.07	**95**	7.71	24.98	1.86
8	0.28	15.13	1.62	**52**	4.58	18.79	2.22	**96**	8.44	24.39	1.73
9	-0.18	13.77	0.75	**53**	4.69	21.24	2.12	**97**	8.46	23.95	1.40
10	-1.03	14.01	0.33	**54**	5.16	22.09	1.09	**98**	8.67	24.44	1.05
11	0.38	15.25	2.10	**55**	6.23	21.86	0.78	**99**	8.99	25.27	1.56
12	0.44	17.47	0.56	**56**	5.66	22.67	0.14	**100**	9.26	24.75	1.12
13	1.16	17.30	1.81	**57**	5.97	22.84	0.99	**101**	8.21	24.06	1.87
14	1.91	18.77	0.08	**58**	6.21	22.59	0.98	**102**	8.72	23.66	1.05
15	2.60	18.53	0.42	**59**	5.72	21.89	0.07	**103**	8.08	23.50	0.85
16	2.16	19.69	3.25	**60**	5.25	21.08	0.41	**104**	8.28	24.59	1.07
17	2.25	18.41	0.42	**61**	5.66	20.98	4.23	**105**	8.33	25.94	0.73
18	3.18	19.96	0.06	**62**	5.21	21.09	1.06	**106**	9.17	26.96	2.11
19	2.30	18.09	0.77	**63**	5.60	21.71	1.51	**107**	10.00	27.20	0.48
20	1.00	17.71	6.07	**64**	6.31	23.33	0.10	**108**	9.92	25.97	3.34
21	0.52	17.31	1.19	**65**	6.60	23.05	0.82	**109**	9.59	25.24	1.15
22	1.28	16.53	0.73	**66**	7.10	23.89	1.74	**110**	10.40	25.53	1.17
23	2.17	17.70	0.17	**67**	6.43	22.94	4.37	**111**	10.64	27.41	2.43
24	2.25	18.99	2.42	**68**	6.55	23.45	1.92	**112**	9.86	25.11	1.58
25	2.71	17.70	0.20	**69**	5.73	22.56	0.72	**113**	9.68	26.24	0.96
26	1.84	18.01	4.97	**70**	6.09	22.55	2.10	**114**	10.24	26.27	0.63
27	1.73	17.39	1.13	**71**	6.61	22.84	0.69	**115**	11.01	26.40	0.69
28	1.77	18.73	0.05	**72**	6.56	22.82	1.83	**116**	10.64	26.50	1.57
29	3.70	17.38	0.63	**73**	7.78	23.95	0.53	**117**	10.13	26.75	6.31
30	3.69	18.93	3.26	**74**	6.11	23.46	0.40	**118**	9.04	25.30	0.66
31	2.78	18.46	1.14	**75**	5.43	22.50	0.37	**119**	8.69	24.44	3.98
32	2.13	17.69	0.27	**76**	7.40	24.03	0.20	**120**	8.59	25.30	2.69
33	1.72	19.34	0.79	**77**	7.87	22.99	1.19	**121**	9.40	25.16	0.63
34	1.87	17.59	1.26	**78**	7.08	23.93	1.19	**122**	9.83	23.67	0.38
35	2.64	17.60	0.57	**79**	7.66	23.89	1.05	**123**	10.41	25.73	0.39
36	3.49	17.56	1.71	**80**	7.54	24.48	3.14	**124**	10.95	26.01	3.08
37	2.78	16.78	0.36	**81**	7.72	24.66	0.80	**125**	11.11	24.93	2.63
38	2.88	18.40	1.93	**82**	7.48	24.85	0.69	**126**	10.56	24.75	0.64
39	3.14	18.81	0.80	**83**	7.04	24.79	1.32	**127**	9.97	26.03	0.53
40	2.76	20.02	0.95	**84**	7.34	23.74	0.36	**128**	11.51	26.63	0.84
41	3.02	18.76	0.46	**85**	7.68	26.01	0.22	**129**	10.48	26.63	1.39
42	2.47	18.70	0.20	**86**	7.95	26.32	3.09	**130**	10.60	28.18	2.35
43	3.80	21.63	0.32	**87**	8.02	25.68	0.34	**131**	10.67	27.74	0.12
44	3.87	21.97	0.77	**88**	7.44	22.82	0.18	**132**	11.79	26.87	1.83

Hooker											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
133	12.35	28.78	0.49	**177**	12.80	28.89	0.05	**221**	7.86	21.31	0.45
134	12.00	27.72	0.04	**178**	11.79	28.04	0.30	**222**	7.18	23.27	0.14
135	11.50	29.11	1.08	**179**	10.93	26.96	4.05	**223**	7.79	24.14	0.18
136	11.05	28.71	1.96	**180**	10.66	25.70	0.70	**224**	9.06	25.51	0.86
137	10.52	27.73	2.50	**181**	11.49	26.74	0.34	**225**	8.74	24.11	1.28
138	10.89	27.67	1.00	**182**	11.55	27.41	1.95	**226**	8.40	24.31	1.14
139	12.94	28.72	1.94	**183**	11.13	26.71	1.22	**227**	9.87	23.40	0.84
140	12.53	27.96	2.11	**184**	11.99	26.42	1.21	**228**	7.33	22.46	2.86
141	12.06	28.01	2.07	**185**	10.44	25.27	2.63	**229**	8.09	23.78	2.02
142	11.63	28.47	1.63	**186**	11.17	28.31	1.80	**230**	8.20	24.15	1.02
143	12.40	27.90	2.53	**187**	11.38	28.92	1.94	**231**	8.34	24.28	0.78
144	11.42	27.08	0.34	**188**	11.17	28.20	0.96	**232**	7.65	22.36	2.91
145	11.50	28.41	0.76	**189**	11.54	27.51	0.71	**233**	6.94	22.46	2.28
146	11.34	27.26	1.24	**190**	11.19	28.19	1.30	**234**	7.24	22.03	0.76
147	11.70	26.24	1.07	**191**	11.79	26.79	0.27	**235**	7.47	23.99	0.34
148	11.57	26.48	3.66	**192**	10.56	27.21	1.61	**236**	7.76	23.37	0.72
149	12.33	27.00	1.09	**193**	11.12	27.46	1.40	**237**	7.37	23.48	0.17
150	12.64	28.68	1.20	**194**	11.21	25.90	1.64	**238**	7.90	23.89	4.03
151	11.77	27.14	2.46	**195**	9.32	24.90	1.34	**239**	7.90	23.40	2.23
152	13.10	28.55	1.80	**196**	9.60	25.23	0.82	**240**	7.15	22.61	2.25
153	11.86	26.54	1.91	**197**	10.01	24.86	1.48	**241**	6.61	21.97	0.10
154	11.75	25.38	0.72	**198**	9.96	25.16	0.13	**242**	7.49	23.40	0.07
155	11.98	26.87	0.51	**199**	9.81	26.20	2.37	**243**	7.85	23.26	1.10
156	11.77	26.05	4.26	**200**	10.29	26.21	1.66	**244**	7.71	22.86	0.26
157	11.84	26.07	2.03	**201**	9.61	26.01	1.91	**245**	7.01	20.70	3.15
158	12.26	26.66	2.74	**202**	9.54	24.44	4.23	**246**	5.82	20.00	2.96
159	12.21	28.07	0.81	**203**	9.77	24.50	1.93	**247**	6.77	22.04	2.31
160	12.42	28.70	1.74	**204**	9.50	23.83	2.76	**248**	7.63	24.46	0.04
161	11.34	28.06	3.04	**205**	9.32	25.20	0.23	**249**	6.79	21.80	0.43
162	11.12	27.12	2.51	**206**	8.74	25.04	0.46	**250**	6.97	22.80	0.20
163	11.49	26.03	3.90	**207**	8.48	23.21	0.56	**251**	6.60	23.91	1.04
164	11.73	26.83	0.22	**208**	7.92	23.96	3.16	**252**	6.73	22.77	0.33
165	11.43	27.69	0.55	**209**	8.39	23.76	2.60	**253**	6.81	21.74	1.68
166	11.69	28.69	1.70	**210**	8.80	24.12	1.35	**254**	5.70	20.76	1.33
167	13.04	29.55	1.23	**211**	9.19	24.60	0.00	**255**	5.53	20.78	6.08
168	11.97	28.53	0.49	**212**	8.40	25.05	0.54	**256**	6.07	18.90	2.38
169	12.05	28.36	0.39	**213**	9.27	25.47	1.51	**257**	6.46	18.17	3.50
170	12.18	27.74	0.70	**214**	8.61	23.52	0.96	**258**	5.36	19.34	2.07
171	12.95	28.18	1.64	**215**	8.07	23.97	0.78	**259**	5.29	19.49	2.19
172	11.90	28.20	2.41	**216**	9.70	24.50	0.91	**260**	4.73	19.16	1.17
173	11.00	27.72	1.71	**217**	8.37	22.93	2.13	**261**	4.81	20.10	0.45
174	10.19	26.99	0.35	**218**	9.19	23.04	1.63	**262**	4.37	20.19	4.79
175	10.64	26.07	2.65	**219**	7.13	23.15	3.46	**263**	5.08	21.22	1.23
176	11.49	27.57	1.71	**220**	7.68	22.27	1.29	**264**	5.35	20.20	1.28

Hooker											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
265	5.53	20.62	0.31	**310**	0.10	15.73	0.95	**355**	1.10	15.27	2.75
266	4.08	19.80	0.58	**311**	-0.30	16.30	0.60	**356**	0.41	15.07	1.23
267	2.88	18.62	1.55	**312**	0.55	16.77	0.74	**357**	-0.28	14.29	0.57
268	2.90	16.52	2.98	**313**	0.58	14.75	0.88	**358**	-0.91	13.97	0.05
269	2.47	18.99	0.28	**314**	-0.93	16.81	0.53	**359**	-1.31	13.76	0.60
270	2.74	19.21	2.25	**315**	-0.26	14.56	0.76	**360**	-0.77	14.84	0.42
271	4.00	19.66	0.66	**316**	-0.97	16.01	0.36	**361**	0.44	15.40	0.41
272	3.21	19.39	1.30	**317**	1.63	19.04	0.15	**362**	1.04	17.37	0.09
273	2.44	18.26	0.56	**318**	0.68	16.86	1.20	**363**	1.34	17.79	1.90
274	2.35	17.75	1.25	**319**	0.80	16.54	1.50	**364**	0.87	15.21	1.40
275	3.72	20.02	0.70	**320**	1.01	17.37	1.04	**365**	0.41	15.47	0.62
276	4.70	21.17	0.19	**321**	1.00	16.47	0.92				
277	3.73	19.08	1.61	**322**	0.05	15.68	1.23				
278	3.17	18.28	0.91	**323**	0.49	15.64	0.66				
279	2.41	18.60	0.11	**324**	1.07	16.23	1.90				
280	2.34	18.22	0.58	**325**	0.62	15.29	1.10				
281	2.39	19.26	0.49	**326**	-0.15	16.98	0.88				
282	3.55	19.48	1.53	**327**	0.56	15.88	0.28				
283	1.77	16.45	1.17	**328**	0.19	16.00	0.16				
284	1.75	17.40	0.81	**329**	-0.92	14.77	0.50				
285	2.02	19.14	0.16	**330**	-0.89	15.96	0.28				
286	1.42	17.41	0.00	**331**	0.10	17.10	0.74				
287	2.27	19.78	0.01	**332**	-0.49	16.26	1.09				
288	2.89	20.95	1.08	**333**	-0.33	16.70	1.93				
289	3.17	20.03	0.10	**334**	-0.62	14.87	0.74				
290	3.59	20.65	0.73	**335**	-1.40	15.65	3.40				
291	3.48	20.56	0.09	**336**	-0.71	14.02	0.42				
292	2.75	18.00	0.94	**337**	-0.51	13.00	0.13				
293	0.98	17.78	0.46	**338**	-1.33	14.02	1.28				
294	2.44	19.26	1.43	**339**	-0.93	15.75	0.07				
295	1.50	16.50	0.58	**340**	-0.91	16.14	0.15				
296	1.01	17.59	1.04	**341**	1.06	17.53	0.03				
297	1.31	18.58	0.45	**342**	0.56	16.95	2.31				
298	1.82	17.99	0.43	**343**	-1.49	14.84	1.15				
299	1.33	16.92	1.76	**344**	-0.58	14.96	2.07				
300	1.64	18.14	0.95	**345**	0.13	17.08	0.25				
301	2.00	17.96	0.02	**346**	0.96	17.99	0.52				
302	1.86	17.34	0.55	**347**	0.63	16.68	0.58				
303	1.18	18.41	0.66	**348**	0.18	15.65	0.93				
304	1.69	18.11	1.27	**349**	0.69	16.38	0.95				
305	1.38	17.22	0.82	**350**	0.21	16.52	1.47				
306	1.81	17.61	0.56	**351**	-0.66	15.73	0.32				
307	2.20	19.05	0.10	**352**	-0.89	13.66	0.56				
308	0.90	15.42	1.10	**353**	0.45	15.24	1.59				
309	1.37	18.37	1.53	**354**	5.55	21.82	1.69				

Beaver											
day	min T[℃]	max T[℃]	rain(mm)	day	min T[℃]	max T[℃]	rain(mm)	day	min T[℃]	max T[℃]	rain(mm)
1	5.96	21.26	1.64	**45**	0.87	16.25	3.10	**89**	-0.87	15.87	0.66
2	4.61	20.66	4.24	**46**	1.69	16.35	1.14	**90**	-0.86	14.74	1.23
3	4.82	21.61	1.21	**47**	0.84	16.41	0.14	**91**	0.33	17.08	1.85
4	5.96	22.81	2.09	**48**	1.61	17.86	0.78	**92**	0.52	17.50	0.89
5	6.41	22.85	4.56	**49**	2.28	18.57	0.89	**93**	1.10	16.73	2.47
6	5.45	21.77	0.66	**50**	1.99	18.78	0.99	**94**	1.63	17.39	0.50
7	5.45	21.09	0.19	**51**	2.13	18.78	0.17	**95**	0.57	17.68	0.74
8	5.28	22.37	0.28	**52**	2.03	18.18	2.36	**96**	0.24	17.95	1.64
9	6.15	21.20	1.37	**53**	2.27	18.02	1.30	**97**	-0.52	17.80	0.03
10	5.63	21.20	0.05	**54**	1.35	18.93	0.87	**98**	-0.79	16.84	0.43
11	5.21	20.15	1.96	**55**	1.19	18.65	1.27	**99**	0.09	16.24	0.59
12	4.25	20.30	2.06	**56**	2.34	19.69	0.45	**100**	0.50	17.77	0.17
13	3.75	19.43	1.49	**57**	1.22	20.09	0.46	**101**	1.72	18.56	0.72
14	3.48	20.24	3.91	**58**	0.84	17.79	0.56	**102**	1.22	18.08	0.79
15	3.83	19.76	1.60	**59**	1.49	18.78	0.12	**103**	-0.97	14.89	0.75
16	3.94	20.54	0.34	**60**	1.28	20.44	0.10	**104**	-1.33	17.28	0.14
17	4.75	21.45	1.01	**61**	1.53	19.37	0.48	**105**	-0.02	18.37	0.71
18	2.90	20.13	3.25	**62**	1.39	18.25	3.72	**106**	-0.53	19.14	0.48
19	3.16	21.08	0.37	**63**	1.11	15.93	0.96	**107**	1.53	18.26	1.60
20	3.20	19.40	1.59	**64**	0.88	17.66	1.40	**108**	2.25	19.84	2.14
21	3.20	18.84	2.09	**65**	0.54	19.77	0.75	**109**	1.33	17.83	1.42
22	2.30	18.17	1.75	**66**	3.26	19.28	1.24	**110**	1.09	18.03	0.54
23	2.42	19.84	1.83	**67**	2.39	19.31	1.19	**111**	-0.27	19.49	0.16
24	4.15	20.20	0.88	**68**	1.69	18.17	0.35	**112**	0.44	18.10	0.85
25	3.54	19.55	0.65	**69**	1.13	18.31	0.40	**113**	1.11	16.26	3.30
26	2.68	18.04	0.96	**70**	0.76	18.24	1.11	**114**	-0.20	16.66	2.05
27	4.75	18.92	0.35	**71**	2.49	18.89	1.73	**115**	1.22	18.78	0.16
28	3.89	18.51	1.86	**72**	2.30	19.09	0.77	**116**	2.62	19.71	0.57
29	2.36	18.66	1.00	**73**	0.34	18.80	0.13	**117**	1.72	18.26	0.53
30	1.95	19.64	0.02	**74**	1.34	19.54	1.74	**118**	1.02	17.58	1.32
31	2.88	20.71	1.34	**75**	1.25	18.15	1.24	**119**	0.50	19.00	3.51
32	2.63	19.32	1.17	**76**	0.98	17.87	1.12	**120**	1.04	18.54	1.63
33	3.08	20.29	1.07	**77**	2.56	18.75	0.27	**121**	0.80	18.38	2.47
34	3.11	19.54	2.90	**78**	2.08	19.33	0.40	**122**	0.35	17.95	1.40
35	3.50	19.46	2.86	**79**	1.20	18.65	2.00	**123**	0.82	16.76	0.10
36	2.24	17.48	0.92	**80**	1.02	17.92	1.60	**124**	-0.90	13.72	2.25
37	1.72	17.89	0.32	**81**	2.43	18.25	1.95	**125**	-0.15	17.05	1.43
38	1.95	19.01	0.61	**82**	1.74	18.63	1.26	**126**	1.28	16.64	1.46
39	3.05	17.30	0.99	**83**	2.28	18.72	0.00	**127**	1.64	15.03	3.86
40	1.28	16.68	0.62	**84**	1.21	18.88	1.70	**128**	-0.18	15.19	1.07
41	1.66	17.68	1.12	**85**	0.61	16.31	1.30	**129**	-0.39	16.07	0.61
42	1.35	17.80	0.10	**86**	1.33	18.30	0.22	**130**	1.14	16.61	0.79
43	1.33	17.24	0.15	**87**	1.13	17.13	1.26	**131**	1.28	17.67	0.96
44	0.89	17.13	2.37	**88**	0.70	17.12	2.02	**132**	0.35	15.12	0.70

Beaver											
day	min T[℃]	max T[℃]	rain(mm)	day	min T[℃]	max T[℃]	rain(mm)	day	min T[℃]	max T[℃]	rain(mm)
133	0.49	17.71	0.04	**177**	7.12	21.81	1.20	**221**	8.47	24.52	0.89
134	1.31	18.32	1.74	**178**	5.76	20.90	3.03	**222**	8.81	26.01	0.96
135	2.02	18.05	0.30	**179**	5.69	21.58	1.64	**223**	9.55	25.86	3.04
136	1.81	18.96	0.98	**180**	6.14	21.95	0.66	**224**	9.89	26.96	3.21
137	1.28	19.80	0.04	**181**	6.47	22.53	2.16	**225**	9.15	25.63	3.15
138	1.46	18.13	0.68	**182**	6.65	21.54	1.02	**226**	8.65	24.74	2.14
139	2.76	20.97	0.22	**183**	6.26	23.16	0.07	**227**	9.15	24.94	0.92
140	1.67	18.16	0.86	**184**	6.16	21.21	2.04	**228**	9.40	26.61	0.13
141	2.16	19.22	1.37	**185**	5.25	18.87	2.04	**229**	10.14	27.57	0.53
142	2.60	18.73	1.35	**186**	5.11	20.86	3.68	**230**	10.22	26.93	1.12
143	1.36	18.65	0.13	**187**	5.57	22.11	1.86	**231**	10.53	26.01	3.99
144	1.92	18.74	0.00	**188**	6.48	22.70	0.85	**232**	10.59	27.22	0.79
145	3.75	21.26	0.75	**189**	6.71	22.67	1.78	**233**	10.23	26.26	3.36
146	3.83	21.48	2.24	**190**	7.51	23.76	3.53	**234**	10.11	25.35	1.80
147	3.17	19.53	0.79	**191**	6.28	22.42	2.05	**235**	9.88	23.63	3.22
148	2.45	21.91	1.09	**192**	6.11	21.88	1.27	**236**	10.36	24.57	1.91
149	3.62	21.06	0.86	**193**	5.41	20.69	2.00	**237**	9.99	25.59	4.92
150	4.11	21.27	0.58	**194**	5.91	20.87	1.50	**238**	10.20	25.25	1.00
151	4.36	22.54	1.12	**195**	6.05	21.89	1.23	**239**	9.74	26.21	0.02
152	3.03	19.49	1.38	**196**	8.09	24.78	1.46	**240**	9.81	27.07	1.88
153	3.46	19.97	3.64	**197**	8.21	24.05	1.94	**241**	10.59	27.19	1.69
154	2.48	18.78	0.79	**198**	7.37	23.32	2.04	**242**	9.48	26.60	1.11
155	2.86	19.13	1.80	**199**	8.29	23.15	1.77	**243**	10.15	26.92	0.99
156	2.61	19.65	1.66	**200**	7.46	24.22	1.67	**244**	10.84	27.81	2.67
157	2.61	20.26	2.14	**201**	7.79	23.59	0.84	**245**	10.66	26.44	1.08
158	3.85	20.99	0.76	**202**	7.68	24.38	1.81	**246**	11.24	27.42	0.53
159	5.28	22.75	0.15	**203**	7.52	24.02	0.64	**247**	10.76	26.96	1.97
160	4.26	22.82	3.51	**204**	8.26	24.09	2.21	**248**	9.76	26.59	2.13
161	3.82	20.87	0.40	**205**	6.67	23.90	1.10	**249**	9.95	26.68	1.63
162	4.36	20.13	1.68	**206**	7.85	24.98	0.46	**250**	10.75	26.89	0.71
163	3.92	20.30	0.42	**207**	8.00	25.85	1.52	**251**	10.11	25.25	0.59
164	3.60	19.98	2.84	**208**	8.83	25.36	0.24	**252**	9.13	26.04	1.44
165	4.00	18.71	1.67	**209**	8.63	24.47	0.96	**253**	9.76	25.26	1.03
166	4.22	18.93	3.42	**210**	8.70	25.18	2.10	**254**	10.91	27.26	0.19
167	3.35	18.60	1.67	**211**	8.55	23.78	0.32	**255**	11.16	28.21	1.07
168	4.37	20.53	0.21	**212**	8.59	23.83	1.30	**256**	11.31	27.44	5.14
169	3.46	20.21	0.47	**213**	7.69	23.32	2.00	**257**	11.19	26.03	0.98
170	3.61	19.32	3.55	**214**	8.67	23.46	0.58	**258**	10.41	26.26	1.83
171	5.46	20.34	4.91	**215**	8.63	25.06	1.74	**259**	9.62	25.13	3.53
172	5.10	19.61	3.42	**216**	8.90	24.80	5.01	**260**	9.23	25.96	0.69
173	5.13	20.20	1.17	**217**	9.09	25.13	3.18	**261**	9.45	25.46	2.69
174	5.33	20.33	2.79	**218**	8.46	24.26	2.73	**262**	9.07	26.51	1.34
175	5.87	21.79	1.54	**219**	8.85	24.72	0.93	**263**	10.15	26.85	0.92
176	5.31	21.99	3.71	**220**	8.81	24.82	1.78	**264**	10.00	26.80	0.72

Beaver											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
265	10.12	26.86	0.30	**309**	8.95	24.85	3.92	**353**	6.18	21.61	0.89
266	9.91	28.21	1.88	**310**	8.39	25.33	3.28	**354**	5.64	21.91	4.36
267	10.16	26.65	0.80	**311**	7.99	24.51	1.38	**355**	4.76	20.08	0.91
268	10.26	26.82	2.52	**312**	8.28	25.57	1.22	**356**	4.33	20.30	0.74
269	10.69	27.23	0.84	**313**	8.78	25.89	1.05	**357**	6.00	22.39	0.99
270	12.35	28.80	1.12	**314**	7.73	25.31	2.66	**358**	4.73	20.12	2.39
271	11.27	27.76	5.86	**315**	8.03	25.00	0.65	**359**	4.97	20.11	2.21
272	10.81	25.82	4.07	**316**	8.17	25.56	1.02	**360**	4.93	20.06	3.23
273	9.85	24.41	1.45	**317**	10.21	27.55	1.52	**361**	4.98	19.69	2.66
274	9.44	25.61	2.66	**318**	9.38	26.72	2.19	**362**	4.54	19.74	0.44
275	9.16	25.26	1.48	**319**	9.36	26.07	1.52	**363**	4.80	19.31	0.51
276	10.20	27.91	1.37	**320**	9.60	24.62	0.67	**364**	4.24	19.35	1.50
277	10.76	28.11	2.75	**321**	9.70	24.36	3.61	**365**	4.84	19.62	1.79
278	10.77	26.52	3.33	**322**	8.67	23.45	6.34				
279	10.24	26.46	1.48	**323**	9.00	25.50	3.07				
280	10.79	27.38	0.08	**324**	9.08	25.72	0.97				
281	10.68	26.74	1.79	**325**	8.25	24.69	1.92				
282	10.27	27.60	1.09	**326**	8.56	22.29	2.19				
283	10.42	28.14	1.54	**327**	8.17	23.77	2.00				
284	11.23	27.43	1.50	**328**	7.82	24.32	1.49				
285	11.87	27.51	1.24	**329**	8.51	25.16	0.70				
286	9.91	25.72	2.54	**330**	8.39	26.31	1.84				
287	9.34	25.56	3.20	**331**	7.30	23.03	1.97				
288	9.13	25.87	1.84	**332**	7.28	22.53	1.31				
289	9.42	26.84	1.60	**333**	7.27	22.64	2.87				
290	9.94	27.02	4.03	**334**	7.38	22.99	0.26				
291	10.58	27.24	0.76	**335**	7.20	23.79	2.53				
292	11.27	27.18	3.98	**336**	7.37	22.71	0.89				
293	10.34	24.81	4.32	**337**	6.83	23.44	1.15				
294	10.15	24.89	4.06	**338**	7.95	22.81	0.47				
295	9.73	26.07	0.38	**339**	6.78	22.81	0.84				
296	10.45	27.14	0.45	**340**	6.64	19.79	2.89				
297	10.64	27.89	2.54	**341**	6.25	21.07	0.81				
298	10.63	28.63	0.22	**342**	6.17	21.94	0.52				
299	11.15	30.42	0.70	**343**	6.24	22.45	1.38				
300	11.34	27.44	3.52	**344**	6.22	22.11	0.81				
301	10.74	25.68	0.63	**345**	6.51	22.26	1.23				
302	8.70	25.42	0.93	**346**	6.20	22.45	0.12				
303	8.30	25.62	1.47	**347**	5.23	19.65	2.28				
304	8.75	26.01	1.68	**348**	5.75	20.00	1.35				
305	8.89	25.17	2.53	**349**	5.79	21.17	0.53				
306	7.78	23.58	0.59	**350**	4.67	19.73	3.62				
307	7.94	24.28	2.12	**351**	4.56	19.43	1.38				
308	8.49	24.39	2.08	**352**	5.61	21.11	1.29				

Woodward											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
1	-4.84	9.83	0.26	**45**	1.83	17.43	1.82	**89**	7.00	21.00	0.93
2	-5.06	10.23	1.14	**46**	2.15	18.70	0.93	**90**	5.72	20.78	1.83
3	-3.62	11.25	1.00	**47**	1.09	17.52	0.75	**91**	6.55	22.27	0.63
4	-2.81	13.17	1.39	**48**	1.18	16.59	1.30	**92**	6.62	23.45	1.43
5	-1.91	12.30	1.14	**49**	1.39	17.99	3.64	**93**	8.45	22.95	3.65
6	-2.54	10.99	3.00	**50**	1.69	16.29	2.30	**94**	8.80	24.45	2.25
7	-3.32	11.36	0.99	**51**	1.72	16.00	1.68	**95**	10.30	25.73	1.21
8	-4.24	10.34	0.79	**52**	1.83	16.09	0.52	**96**	10.24	25.55	2.45
9	-3.68	10.33	1.28	**53**	1.68	16.93	2.21	**97**	9.86	26.67	3.82
10	-3.39	11.75	1.46	**54**	2.66	18.50	2.43	**98**	10.27	26.03	3.46
11	-4.00	11.34	1.23	**55**	3.33	18.38	1.47	**99**	9.63	24.80	4.44
12	-4.35	11.16	2.64	**56**	2.93	18.16	0.74	**100**	9.76	24.39	6.04
13	-2.25	12.47	3.39	**57**	2.83	18.48	4.46	**101**	9.36	24.24	1.70
14	-3.61	13.05	1.65	**58**	2.57	18.17	0.96	**102**	9.87	24.78	2.40
15	-3.50	11.76	0.91	**59**	3.24	19.20	1.59	**103**	10.68	26.39	4.21
16	-2.97	12.48	1.56	**60**	2.95	19.46	0.25	**104**	11.46	27.39	3.06
17	-2.95	12.77	0.56	**61**	3.66	18.93	2.22	**105**	11.30	27.51	3.68
18	-3.32	10.57	0.92	**62**	4.08	19.84	0.21	**106**	11.53	27.50	3.69
19	-4.01	12.12	1.05	**63**	3.99	19.94	0.07	**107**	10.99	26.51	3.44
20	-3.12	13.35	1.57	**64**	4.03	19.18	0.85	**108**	12.10	26.15	4.96
21	-2.79	12.95	1.85	**65**	3.93	20.96	4.13	**109**	11.88	26.24	5.12
22	-3.00	13.53	1.10	**66**	4.95	20.16	1.89	**110**	11.01	25.90	4.66
23	-2.10	12.82	0.31	**67**	4.55	19.74	0.24	**111**	11.12	27.82	2.13
24	-2.01	13.72	2.77	**68**	4.38	21.03	1.69	**112**	13.37	28.15	1.97
25	-1.94	14.42	3.91	**69**	4.32	20.20	3.24	**113**	12.71	27.57	4.27
26	-0.29	16.30	1.16	**70**	3.98	18.92	2.96	**114**	13.77	27.30	3.09
27	-0.48	15.09	0.80	**71**	4.11	20.14	1.54	**115**	13.37	28.09	1.73
28	-0.94	13.91	3.24	**72**	4.05	19.74	0.42	**116**	13.05	28.22	7.51
29	-0.76	14.34	2.27	**73**	4.82	19.66	1.37	**117**	12.29	28.16	5.09
30	-0.61	13.80	0.92	**74**	5.47	20.68	1.30	**118**	12.58	27.42	2.07
31	-0.21	13.91	1.58	**75**	5.97	20.73	1.33	**119**	12.57	27.10	5.39
32	-1.18	12.69	1.30	**76**	6.16	20.22	2.94	**120**	12.30	26.54	0.54
33	-0.88	14.14	0.00	**77**	4.91	20.49	7.41	**121**	12.83	26.21	0.99
34	-0.99	14.60	0.68	**78**	4.47	20.42	0.45	**122**	12.51	27.41	1.45
35	-0.49	12.35	3.85	**79**	4.93	21.27	2.96	**123**	12.64	27.05	2.26
36	-1.48	13.46	1.55	**80**	6.71	22.50	0.81	**124**	14.06	28.70	2.75
37	0.45	14.76	1.74	**81**	7.58	23.71	3.43	**125**	13.98	28.88	0.62
38	-0.32	14.10	1.80	**82**	8.02	24.85	4.80	**126**	14.61	29.26	0.79
39	-0.32	14.11	0.69	**83**	7.87	23.85	1.23	**127**	14.82	29.27	4.93
40	0.24	15.10	0.79	**84**	7.52	24.17	0.79	**128**	15.48	29.90	3.23
41	0.05	15.65	1.59	**85**	7.89	23.10	1.13	**129**	15.05	30.46	3.06
42	0.35	14.57	1.67	**86**	6.84	22.79	4.58	**130**	15.14	30.28	3.10
43	0.70	15.82	2.29	**87**	6.57	22.05	3.42	**131**	15.62	29.32	2.17
44	0.76	16.76	0.70	**88**	6.49	22.09	4.51	**132**	15.48	30.04	1.76

Woodward											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
133	16.03	30.48	1.44	**177**	18.94	33.30	2.61	**221**	14.67	28.57	2.33
134	15.85	30.27	3.27	**178**	17.82	31.77	3.48	**222**	14.47	29.05	1.43
135	15.60	29.69	3.19	**179**	17.81	32.19	1.88	**223**	14.44	29.70	0.76
136	15.26	30.82	1.32	**180**	18.09	33.13	1.57	**224**	14.17	29.62	0.53
137	16.14	30.56	1.79	**181**	19.12	33.21	0.16	**225**	14.27	30.28	3.43
138	16.54	30.84	0.47	**182**	18.62	33.11	1.00	**226**	14.49	29.33	1.97
139	15.72	30.58	0.74	**183**	18.27	32.94	1.29	**227**	14.08	29.11	6.00
140	15.80	30.44	0.76	**184**	18.43	33.43	1.40	**228**	13.37	28.49	5.35
141	16.34	29.52	0.22	**185**	18.50	33.80	1.42	**229**	12.98	28.27	0.90
142	16.24	29.97	1.51	**186**	18.24	33.43	3.83	**230**	13.61	29.38	0.89
143	16.65	31.21	0.51	**187**	18.53	34.08	0.49	**231**	13.54	28.42	2.82
144	16.67	31.57	0.91	**188**	18.88	33.51	2.56	**232**	13.12	27.90	0.66
145	17.17	30.41	0.42	**189**	18.80	34.67	1.62	**233**	12.62	27.17	0.55
146	16.60	29.92	2.81	**190**	19.14	35.01	3.16	**234**	12.88	26.26	0.55
147	16.78	30.47	2.05	**191**	19.71	35.07	1.50	**235**	13.15	26.25	0.54
148	16.87	31.31	0.24	**192**	19.28	34.18	1.54	**236**	12.51	26.70	1.30
149	16.75	31.18	2.60	**193**	18.55	32.51	1.15	**237**	11.87	26.63	1.08
150	16.89	31.55	2.55	**194**	18.04	33.28	1.20	**238**	11.85	25.34	0.45
151	17.09	32.43	5.10	**195**	18.08	32.68	0.49	**239**	11.74	24.86	2.21
152	17.18	31.42	2.95	**196**	17.58	32.14	1.66	**240**	11.25	25.10	0.37
153	17.82	31.56	1.39	**197**	18.01	32.09	0.71	**241**	12.10	26.45	0.39
154	17.96	30.77	3.01	**198**	17.75	32.94	1.98	**242**	11.31	25.04	1.48
155	17.76	31.02	4.33	**199**	18.44	33.42	1.67	**243**	11.04	24.73	1.17
156	18.25	32.10	2.03	**200**	18.19	32.85	0.95	**244**	10.52	25.49	0.61
157	18.47	32.92	4.18	**201**	17.49	32.36	1.62	**245**	11.36	26.55	1.42
158	18.14	33.80	1.36	**202**	16.91	31.70	2.07	**246**	10.83	25.46	1.03
159	18.33	33.70	6.01	**203**	17.01	32.22	0.72	**247**	9.83	25.48	1.21
160	18.58	33.03	2.28	**204**	16.94	31.47	1.61	**248**	10.32	25.25	1.96
161	18.39	33.06	1.57	**205**	14.93	31.01	1.36	**249**	10.12	24.66	0.64
162	17.66	32.82	2.87	**206**	16.56	30.64	1.92	**250**	11.14	26.15	0.97
163	17.68	33.14	4.19	**207**	16.19	30.95	1.97	**251**	9.80	25.28	5.13
164	17.87	32.89	0.19	**208**	15.83	30.52	2.90	**252**	8.66	24.69	2.99
165	18.11	32.64	2.35	**209**	16.51	31.48	1.50	**253**	8.74	24.99	0.03
166	18.40	33.16	2.21	**210**	16.00	31.25	3.72	**254**	9.20	24.79	0.71
167	18.98	34.10	2.67	**211**	16.74	30.89	2.46	**255**	8.46	23.22	1.11
168	18.39	33.98	1.70	**212**	15.97	29.96	1.97	**256**	8.27	22.96	1.31
169	18.45	33.64	2.58	**213**	15.48	29.03	3.63	**257**	7.97	23.47	4.22
170	19.15	34.29	2.19	**214**	16.13	29.98	2.93	**258**	8.16	23.15	3.01
171	19.53	35.11	0.34	**215**	15.53	30.26	1.79	**259**	7.96	22.65	0.56
172	19.12	34.29	0.42	**216**	15.31	29.95	3.17	**260**	8.17	23.78	0.95
173	18.49	33.38	4.16	**217**	14.82	30.55	2.22	**261**	8.17	23.29	0.61
174	18.97	33.71	2.18	**218**	15.26	29.77	0.32	**262**	7.40	23.16	0.08
175	19.13	34.26	2.96	**219**	16.08	30.84	2.25	**263**	6.82	22.06	1.05
176	19.49	34.05	2.51	**220**	14.85	29.95	3.49	**264**	6.82	21.80	3.13

Woodward											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
265	5.88	21.50	0.77	**309**	-1.27	12.60	0.94	**353**	-5.31	7.16	2.17
266	5.85	22.29	1.20	**310**	-1.86	12.99	1.22	**354**	-5.90	7.91	1.78
267	5.77	22.18	1.10	**311**	-3.38	10.33	1.17	**355**	-6.04	7.88	0.32
268	6.14	21.50	0.33	**312**	-4.08	9.90	1.49	**356**	-5.60	7.68	2.02
269	6.14	21.26	3.53	**313**	-4.21	10.61	1.09	**357**	-5.17	9.70	0.51
270	6.86	21.33	2.10	**314**	-3.99	11.14	0.19	**358**	-4.75	9.32	0.31
271	6.31	20.83	1.26	**315**	-3.31	12.84	0.84	**359**	-4.52	7.79	0.06
272	3.32	18.67	0.79	**316**	-1.65	13.09	1.08	**360**	-6.27	8.37	0.93
273	4.61	19.48	0.44	**317**	-1.81	12.77	0.65	**361**	-5.54	9.04	1.11
274	4.01	18.68	0.75	**318**	-2.35	12.27	1.99	**362**	-4.65	9.22	0.22
275	4.12	19.33	1.79	**319**	-1.71	12.87	0.88	**363**	-3.62	10.51	0.69
276	3.85	19.34	0.23	**320**	-2.64	11.53	0.27	**364**	-4.10	11.05	0.53
277	2.83	19.65	0.80	**321**	-3.03	11.23	0.26	**365**	-4.68	9.87	0.37
278	4.10	20.14	2.07	**322**	-3.75	11.49	0.95				
279	4.15	20.05	1.66	**323**	-3.35	11.58	0.84				
280	3.18	17.53	0.78	**324**	-2.43	12.57	0.05				
281	2.20	18.45	0.23	**325**	-3.50	9.78	0.03				
282	1.23	16.49	1.24	**326**	-3.64	9.99	0.17				
283	1.10	17.97	3.18	**327**	-3.27	12.79	0.49				
284	1.30	17.64	0.73	**328**	-3.15	13.80	1.39				
285	2.16	18.06	1.31	**329**	-3.04	11.40	0.79				
286	1.67	18.09	0.73	**330**	-3.92	10.36	1.13				
287	1.97	18.11	0.21	**331**	-4.37	10.95	0.17				
288	1.46	18.06	0.18	**332**	-4.08	10.68	0.63				
289	1.60	17.37	2.35	**333**	-4.94	9.99	0.51				
290	2.07	17.82	1.97	**334**	-5.47	9.48	0.51				
291	0.77	15.09	0.91	**335**	-4.07	9.53	1.74				
292	-0.20	14.36	1.16	**336**	-4.86	9.37	0.00				
293	-0.64	15.37	2.80	**337**	-5.44	11.26	0.29				
294	-0.33	14.90	2.58	**338**	-3.25	12.68	1.08				
295	0.10	14.57	0.58	**339**	-2.80	12.22	0.24				
296	-0.58	12.98	0.83	**340**	-2.40	11.55	1.25				
297	-1.17	13.43	0.26	**341**	-4.06	11.32	0.51				
298	-0.92	13.74	0.24	**342**	-5.16	9.64	0.43				
299	-0.96	12.53	0.96	**343**	-5.08	10.76	0.46				
300	-1.40	13.09	0.52	**344**	-4.84	11.00	2.61				
301	-1.78	13.56	0.68	**345**	-4.56	11.24	0.72				
302	-1.12	14.43	0.65	**346**	-4.14	10.84	1.41				
303	-0.18	14.77	0.91	**347**	-3.75	10.55	2.50				
304	-1.11	12.74	0.61	**348**	-4.00	9.33	2.18				
305	-1.42	13.13	0.93	**349**	-5.28	9.33	2.36				
306	-1.29	12.89	0.08	**350**	-4.52	8.57	0.44				
307	-2.15	11.85	0.00	**351**	-4.39	9.33	1.06				
308	-2.17	11.83	1.23	**352**	-4.81	9.32	0.89				

LARS-WG output (monthly average):

Boise City											
RAIN(mm)	A1B	A2	B1	min T[°C]	A1B	A2	B1	Max T[°C]	A1B	A2	B1
jan	6.03	4.25	5.46	jan	-6.19	-6.65	-6.36	jan	10.85	10.36	10.65
feb	7.62	9.28	7.76	feb	-5.09	-5.50	-5.12	feb	11.19	10.73	11.19
mar	19.24	19.94	19.71	mar	-1.04	-1.48	-1.27	mar	16.61	16.16	16.43
apr	37.47	34.19	42.17	apr	3.36	3.12	3.16	apr	20.77	20.62	20.62
may	34.03	36.80	30.21	may	9.20	8.81	8.93	may	26.99	26.41	26.85
jun	58.26	57.36	57.04	jun	14.80	14.52	14.76	jun	31.63	31.37	31.45
jul	64.74	66.70	62.81	jul	18.14	17.74	18.12	jul	34.53	34.11	34.58
aug	67.41	71.19	70.76	aug	17.13	16.80	17.07	aug	32.38	32.10	32.31
sep	36.13	33.38	39.22	sep	12.64	12.50	12.57	sep	28.15	28.10	28.08
oct	44.85	44.18	42.91	oct	4.95	4.93	4.91	oct	21.55	21.70	21.51
nov	11.39	13.01	12.08	nov	-0.99	-1.08	-1.18	nov	15.83	15.66	15.73
dec	7.96	9.08	7.52	dec	-6.02	-6.18	-6.34	dec	9.99	9.75	9.70

Goodwell											
RAIN(mm)	A1B	A2	B1	MIN T[°C]	A1B	A2	B1	MAX T[°C]	A1B	A2	B1
jan	8.34	8.05	7.42	jan	-5.10	-5.56	-5.25	jan	11.01	10.55	10.93
feb	12.61	12.92	12.90	feb	-4.19	-4.64	-4.15	feb	11.70	11.24	11.66
mar	27.98	29.07	30.60	mar	0.00	-0.41	-0.23	mar	16.97	16.55	16.64
apr	31.29	32.05	33.15	apr	4.91	4.56	4.59	apr	22.17	21.83	21.82
may	49.00	50.80	49.85	may	10.86	10.54	10.66	may	27.81	27.49	27.59
jun	57.85	60.92	58.51	jun	16.35	15.92	16.24	jun	32.76	32.33	32.67
jul	48.86	50.74	47.73	jul	19.44	18.98	19.45	jul	35.64	35.18	35.59
aug	62.06	59.38	67.70	aug	18.24	17.89	18.24	aug	33.71	33.36	33.65
sep	34.02	33.62	36.91	sep	14.15	13.99	14.07	sep	29.48	29.31	29.38
oct	50.69	53.72	54.58	oct	6.36	6.30	6.35	oct	22.55	22.49	22.50
nov	17.62	19.02	17.99	nov	-0.06	-0.19	-0.34	nov	16.15	16.03	15.96
dec	13.94	14.15	13.00	dec	-5.08	-5.43	-5.51	dec	10.17	9.82	9.80

Hooker											
RAIN(mm)	A1B	A2	B1	min T[°C]	A1B	A2	B1	max T[°C]	A1B	A2	B1
jan	2.83	2.00	2.09	jan	1.01	0.31	0.69	jan	1.10	0.67	0.94
feb	1.21	0.87	-0.68	feb	0.74	0.49	0.74	feb	0.86	0.32	0.71
mar	-3.70	-1.96	1.40	mar	0.76	0.25	0.64	mar	0.73	0.46	0.41
apr	-0.61	-1.85	-0.39	apr	0.95	0.70	0.67	apr	1.21	0.85	0.83
may	-5.63	-1.36	3.03	may	1.01	0.58	0.69	may	1.07	0.76	0.87
jun	-7.50	-5.61	-7.32	jun	0.65	0.24	0.55	jun	0.79	0.26	0.69
jul	0.94	5.48	-3.70	jul	0.94	0.52	1.00	jul	1.12	0.68	1.23
aug	-7.40	-5.95	-5.49	aug	0.74	0.35	0.76	aug	0.55	0.17	0.38
sep	-5.42	-6.08	-7.19	sep	0.94	0.69	0.99	sep	0.27	0.22	0.47
oct	2.99	6.43	-0.95	oct	0.49	0.49	0.40	oct	0.53	0.25	0.67
nov	6.26	8.35	1.77	nov	1.14	1.07	0.91	nov	0.87	0.65	0.83
dec	-0.17	2.04	1.43	dec	0.83	0.35	0.47	dec	1.59	1.13	1.03

Beaver											
RAIN(mm)	A1B	A2	B1	min T[°C]	A1B	A2	B1	max T[°C]	A1B	A2	B1
jan	11.16	11.14	10.44	jan	-5.65	-6.24	-5.84	jan	11.05	10.62	10.76
feb	13.45	13.98	12.97	feb	-4.01	-4.54	-4.13	feb	11.90	11.32	11.80
mar	28.88	29.56	30.21	mar	0.86	0.44	0.67	mar	17.88	17.39	17.64
apr	43.30	47.71	45.35	apr	6.09	5.79	5.77	apr	23.06	22.67	22.68
may	49.36	56.01	52.67	may	11.94	11.60	11.73	may	28.98	28.48	28.76
jun	75.68	73.68	72.69	jun	17.95	17.54	17.80	jun	33.11	32.73	33.01
jul	57.96	59.33	58.50	jul	21.03	20.61	21.00	jul	36.35	35.92	36.33
aug	62.66	64.81	63.52	aug	19.60	19.26	19.60	aug	34.98	34.74	34.96
sep	30.75	33.04	32.10	sep	14.78	14.60	14.77	sep	30.07	29.74	30.02
oct	44.50	50.68	46.20	oct	6.77	6.72	6.79	oct	23.17	23.10	23.05
nov	21.27	25.34	24.48	nov	0.33	0.17	0.05	nov	16.99	16.74	16.74
dec	17.71	19.50	17.81	dec	-4.93	-5.26	-5.34	dec	10.76	10.26	10.37

Woodward											
RAIN(mm)	A1B	A2	B1	min T[°C]	A1B	A2	B1	Max T[°C]	A1B	A2	B1
jan	22.24	21.42	20.39	jan	-3.16	-3.83	-3.42	jan	10.82	10.18	10.56
feb	29.44	30.08	28.82	feb	-1.89	-2.54	-1.98	feb	11.59	10.94	11.50
mar	44.44	45.90	46.97	mar	3.16	2.66	2.93	mar	17.53	17.03	17.29
apr	62.22	63.72	68.54	apr	8.58	8.25	8.25	apr	22.71	22.38	22.39
may	77.44	80.10	76.82	may	14.05	13.75	13.80	may	27.54	27.24	27.29
jun	90.92	94.89	87.55	jun	19.47	19.04	19.33	jun	31.99	31.57	31.85
jul	72.76	76.22	71.03	jul	22.38	21.92	22.35	jul	35.29	34.83	35.26
aug	60.77	61.61	62.45	aug	21.21	20.86	21.21	aug	34.58	34.24	34.59
sep	49.05	48.49	53.07	sep	16.28	16.09	16.27	sep	29.71	29.51	29.69
oct	64.00	66.05	68.30	oct	9.16	9.08	9.08	oct	22.76	22.68	22.68
nov	25.19	26.44	25.97	nov	3.14	3.00	2.89	nov	16.86	16.73	16.61
dec	20.60	21.62	21.03	dec	-2.17	-2.58	-2.57	dec	10.86	10.45	10.46

IHACRES output

Discharge under A1B Scenario (cumec)												
year	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec
2016	1.0061	1.918	1.6149	1.188	1.1908	1.0023	0.401	0.8546	1.2788	0.6789	0.6498	0.8964
2017	3.7701	3.9664	4.0664	4.1554	3.9621	3.3476	2.6248	2.3097	1.8938	1.8608	1.7442	1.6848
2018	1.1814	1.0657	1.135	2.7078	1.9483	1.6175	0.5659	0.3669	1.1956	0.8841	0.8352	0.7906
2019	0.4086	0.913	1.0713	1.8271	1.8056	2.4098	3.4457	3.2992	3.5586	2.2026	1.4549	1.5469
2020	0.8063	0.8084	1.0851	1.7526	4.2587	3.1407	2.1758	1.1215	1.4837	6.2584	3.2239	1.8225
2021	1.4349	1.6596	1.7616	1.7862	1.3428	0.7519	0.4187	0.1682	0.2214	0.6549	1.2996	1.5795
2022	0.6822	0.727	0.8145	0.8774	1.1643	0.8339	0.3083	0.9591	2.1081	3.0176	1.6853	1.2819
2023	0.87	0.9052	0.9564	1.2579	1.0194	0.9379	0.8025	0.1945	7.171	3.3467	1.8716	1.3046
2024	0.7558	1.5626	2.259	3.2836	2.1916	1.4085	6.3701	3.3527	1.5234	0.8335	0.7309	0.8004
2025	1.1672	1.4691	1.5876	1.6656	1.3314	1.3784	1.4031	1.3764	1.6457	2.0638	2.5444	2.6662
2026	0.8339	0.7672	0.8326	0.8535	7.4679	4.1347	1.7439	3.9007	2.0485	0.9686	1.6666	1.2303
2027	0.5612	1.2202	1.5086	1.2212	1.2507	1.4844	0.9795	0.1157	0.6245	0.9606	0.7645	0.8316
2028	0.4349	0.6581	0.8576	1.6311	1.3782	2.2752	2.7593	1.4858	0.895	0.6656	0.7256	0.8514
2029	2.1274	2.343	2.3686	2.5215	2.1335	1.3173	1.0673	0.9153	0.918	1.0958	1.5502	1.7386
2030	1.3616	1.5653	1.6687	1.7287	1.5051	1.0213	0.5926	0.4687	0.517	0.7936	1.9038	2.5166
2031	2.3102	2.6	2.7841	2.9971	2.7845	2.2779	2.0273	1.9604	2.2084	2.553	2.628	2.9563
2032	2.666	2.9386	3.0055	3.0158	2.8087	2.5591	2.5184	2.2187	1.9555	2.181	2.465	2.378
2033	1.9358	2.1661	2.2816	2.3189	2.0024	1.6011	1.4517	1.3823	1.4168	1.6887	2.0767	2.2064
2034	1.8802	2.2168	2.3548	2.5427	2.3319	1.4942	0.9225	0.5523	0.4525	0.6655	1.1598	1.4808
2035	1.1688	1.3579	1.4767	1.4454	1.1501	0.6179	0.3006	0.1132	0.1161	0.4102	0.8942	1.1279
2036	0.799	1.082	1.2124	1.3675	1.2129	0.7374	0.4521	0.3981	0.577	0.874	1.9168	2.5973
2037	2.4203	2.7123	2.8269	2.8607	2.5972	2.1891	1.9562	1.7008	1.5311	1.7207	1.9573	2.271
2038	2.0018	2.2981	2.442	2.5887	2.3263	1.7184	1.3663	1.1727	1.2378	1.5728	1.6897	1.5002
2039	1.0105	1.2064	1.2814	1.3853	1.1622	0.8179	0.6645	0.5056	0.4378	0.6487	1.5419	2.3356
2040	2.2072	2.5659	2.7317	2.7979	2.5641	1.9674	1.6418	1.5791	1.6476	1.9115	1.9783	1.9514
2041	1.5337	1.748	1.8486	1.9242	1.6734	1.1622	0.8255	0.6851	0.9153	1.4051	1.9354	2.0003
2042	1.624	1.859	1.9667	2.085	1.8604	1.3827	1.1749	0.913	0.7344	0.8126	1.1347	1.3932
2043	1.724	1.959	2.0667	2.185	1.9604	1.4827	1.2749	1.013	0.8344	0.9126	1.2347	1.4932
2044	1.2105	1.4064	1.4814	1.5853	1.3622	1.0179	0.8645	0.7056	0.6378	0.8487	1.7419	2.5356
2045	1.2688	1.4579	1.5767	1.5454	1.2501	0.7179	0.4006	0.2132	0.2161	0.5102	0.9942	1.2279

Discharge under A2 Scenario (cumec)												
year	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec
2016	4.3058	4.3425	4.5231	4.3869	4.132	3.5589	2.5288	2.1871	1.6822	1.7793	1.6602	1.6187
2017	1.5705	1.276	1.4345	2.8628	2.021	1.7735	0.3914	0.1504	0.8753	0.7006	0.697	0.6846
2018	0.7985	1.1421	1.3775	1.9328	1.8598	2.6458	3.5482	3.2973	3.2592	2.013	1.3303	1.4983
2019	1.2018	1.0177	1.3886	1.866	4.483	3.4	2.142	0.9917	1.172	6.397	3.2324	1.7752
2020	1.8877	1.9364	2.1122	1.9052	1.3851	0.8383	0.2258	0.0481	0.0712	0.501	1.171	1.4837
2021	1.079	0.9401	1.1045	0.9386	1.1967	0.931	0.1173	0.7538	1.7605	2.7759	1.5377	1.1893
2022	1.2263	1.1002	1.2448	1.3351	1.0354	1.0507	0.6579	0.0199	6.692	3.123	1.7439	1.2016
2023	1.1396	1.8168	2.6343	3.4666	2.2655	1.5461	6.7592	3.4059	1.3084	0.6839	0.5999	0.6974
2024	1.6163	1.7459	1.9394	1.789	1.3835	1.5135	1.2839	1.2515	1.4553	2.021	2.5365	2.6809
2025	1.2721	0.9946	1.1273	0.9142	7.9038	4.4612	1.6581	3.8017	1.7998	0.8269	1.6149	1.1646
2026	0.9648	1.4691	1.843	1.3026	1.2868	1.6452	0.8483	0.0925	0.292	0.7627	0.6154	0.7244
2027	0.8219	0.8662	1.1503	1.7237	1.4085	2.5015	2.7984	1.3534	0.6235	0.5211	0.5979	0.7235
2028	2.5693	2.6239	2.7284	2.6628	2.2039	1.4193	0.9004	0.7347	0.6624	0.9837	1.4762	1.6936
2029	1.8056	1.843	2.0241	1.856	1.5681	1.1333	0.415	0.2794	0.2586	0.6794	1.8677	2.542
2030	2.8396	2.9558	3.2163	3.2081	2.9308	2.4712	1.9477	1.8739	2.0711	2.5659	2.6518	3.0213
2031	3.2286	3.325	3.465	3.2433	2.9724	2.787	2.4878	2.1571	1.7906	2.1497	2.4539	2.3824
2032	2.4282	2.4793	2.6683	2.4735	2.0863	1.7391	1.326	1.2493	1.213	1.6292	2.049	2.2085
2033	2.3698	2.5085	2.714	2.6779	2.4024	1.5902	0.7202	0.3165	0.1339	0.4857	1.0174	1.3831
2034	1.5777	1.6117	1.8125	1.5477	1.1839	0.6972	0.1015	0.104	0.176	0.259	0.7749	1.0416
2035	1.2059	1.3113	1.5159	1.4468	1.231	0.8046	0.2431	0.1839	0.299	0.744	1.8647	2.6132
2036	2.9425	3.0611	3.2498	3.0524	2.7213	2.3673	1.8618	1.5811	1.3266	1.6558	1.9135	2.2763
2037	2.5079	2.6293	2.8491	2.7717	2.443	1.8755	1.2426	1.0312	1.0245	1.5014	1.6291	1.4413
2038	1.4353	1.4504	1.5969	1.474	1.1863	0.9011	0.4821	0.3067	0.1604	0.5125	1.4653	2.3311
2039	2.7111	2.8956	3.1369	2.9727	2.6725	2.1153	1.5107	1.4419	1.44	1.8494	1.9327	1.9321
2040	2.0068	2.0446	2.2195	2.0669	1.75	1.2858	0.6684	0.5147	0.688	1.3242	1.8869	1.972
2041	2.0858	2.1424	2.324	2.2165	1.927	1.499	1.0213	0.7339	0.4628	0.6797	1.0331	1.3327
2042	1.5151	1.6072	1.796	1.633	1.3232	0.8318	0.226	0.0565	0.2662	0.1935	0.7336	0.9843
2043	1.1377	1.2209	1.4223	1.2907	0.9691	0.4972	0.1953	0.408	0.6343	1.0733	1.5637	1.8618
2044	0.7751	1.2209	1.0911	0.8909	0.5832	3.4602	4.7387	3.0512	1.6079	0.6989	0.574	0.6697
2045	0.9751	1.4209	1.2911	1.0909	0.7832	3.6602	4.9387	3.2512	1.8079	0.8989	0.774	0.8697

Discharge under B1 Scenario (cumec)												
year	jan	feb	mar	ap	may	jun	jul	aug	sep	oct	nov	dec
2016	0.2226	0.1097	0.5467	2.9561	2.7874	1.3257	0.4816	0.1707	0.0718	0.1171	0.1863	0.3645
2017	0.8452	0.8156	0.7431	0.7586	0.7601	0.8917	1.2998	1.4476	1.5423	1.5893	1.6366	1.6598
2018	0.5784	0.605	1.2526	1.7269	3.3585	5.8859	2.3793	1.4582	0.8998	0.7868	0.448	0.2412
2019	0.6384	0.5473	0.2536	1.8357	2.701	4.383	2.2164	0.7913	0.34	5.4797	5.8406	2.0578
2020	1.0444	0.6183	1.7281	3.289	3.1059	2.1718	1.1076	0.3405	0.0961	0.0602	0.0731	0.0681
2021	0.9619	1.0119	1.048	1.0034	0.8243	0.7533	0.7466	0.739	0.7296	0.749	0.7996	0.8601
2022	1.1306	1.3274	0.611	0.2919	0.4004	1.5154	1.6433	0.8259	0.5859	0.6794	0.7699	0.2925
2023	0.1179	0.2409	0.2693	0.6488	1.2174	2.801	1.9348	0.6764	0.2499	0.0874	0.0393	0.0355
2024	0.3129	0.5387	0.3588	1.0321	1.4674	0.9762	0.5687	0.7403	0.9788	6.4303	3.169	2.9006
2025	1.0909	1.0257	1.079	1.3946	2.153	2.6303	2.7758	2.8098	2.7643	2.7108	3.1124	3.3391
2026	1.0492	2.4923	4.228	11.984	7.1653	2.5037	0.8771	0.3327	0.3026	5.2548	3.1859	1.2368
2027	0.7096	0.248	0.3607	0.4154	0.7017	0.431	0.9801	0.9046	0.8215	0.4199	0.5565	0.9207
2028	0.6545	1.0137	1.6843	1.2369	5.7448	2.2129	1.2441	0.5687	0.4525	0.4643	0.2989	0.4299
2029	2.0079	2.0283	1.9512	1.7456	1.2951	0.8716	0.6887	0.5607	0.5063	0.5264	0.5519	0.5509
2030	0.5527	0.5889	0.679	0.7816	0.8362	0.8311	0.8684	0.9512	0.9921	0.9499	0.8891	0.8561
2031	0.8468	0.7828	0.6968	0.6685	0.7433	0.7508	0.6916	0.7199	0.759	0.7713	0.7655	0.7647
2032	0.7659	0.7629	0.7511	0.6904	0.614	0.7308	0.8353	0.741	0.6505	0.6156	0.6207	0.6261
2033	0.6202	0.6484	0.6675	0.6823	0.6628	0.5526	0.4752	0.4429	0.4755	0.5433	0.5534	0.5542
2034	0.5565	0.5336	0.5056	0.4761	0.4518	0.6974	0.8201	0.8549	0.8168	0.7571	0.7572	0.7662
2035	0.7714	0.7661	0.7992	0.8633	0.918	0.6331	0.493	0.4464	0.4627	0.5309	0.5861	0.7242
2036	0.8143	0.8515	0.8611	0.9445	1.1431	1.6127	1.8115	1.8748	1.8688	1.7957	1.803	1.6843
2037	1.6348	1.6776	1.6466	1.5657	1.676	1.4847	1.486	1.5134	1.5281	1.574	1.5259	1.542
2038	1.6263	1.6316	1.685	1.6556	1.9701	2.0205	1.9496	1.8999	1.8768	1.8351	1.813	1.831
2039	1.7494	1.7209	1.7094	1.7577	1.1614	1.0568	1.0378	1.0886	1.1186	1.141	1.4324	1.4883
2040	1.5182	1.5035	1.4617	1.3633	1.269	1.07	0.9646	0.9085	0.8976	0.8807	0.578	0.4637
2041	0.3886	0.3791	0.4481	0.4776	0.6152	0.6996	0.7464	0.7657	0.7572	0.7651	0.7672	0.7667
2042	0.7635	0.7447	0.7406	0.8978	0.8609	0.7713	0.7307	0.6904	0.6709	0.6524	0.6498	0.6368
2043	0.6565	0.6656	0.6028	0.555	0.5531	0.5997	0.6004	0.6295	0.7949	0.8697	0.89	0.9173
2044	0.9548	0.5865	1.0619	1.0066	0.9592	0.9654	0.981	0.9447	0.811	0.7623	0.7518	0.7281
2045	0.3900	0.5074	1.2124	0.9612	1.4722	0.8594	0.2943	0.4986	0.4574	0.2244	0.0853	0.2473

APPENDIX B

This section contains output data from LARS-WG and IHACRES models for the future period 2046-2075.

LARS-WG output (monthly average):

Boise City Scenario A1B											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
1	-4.81	11.36	0.22	**46**	-3.05	13.09	0.58	**91**	3.12	20.60	0.74
2	-5.02	11.53	0.19	**47**	-2.94	12.35	0.32	**92**	2.90	20.21	0.76
3	-5.47	12.30	0.13	**48**	-2.93	12.32	0.30	**93**	2.44	19.35	0.61
4	-5.44	10.86	0.25	**49**	-3.82	11.15	0.42	**94**	2.40	20.70	1.15
5	-4.75	11.96	0.18	**50**	-3.58	11.50	0.45	**95**	2.22	19.58	1.39
6	-4.63	12.96	0.09	**51**	-4.40	12.30	0.33	**96**	2.86	19.88	1.96
7	-4.77	12.80	0.19	**52**	-3.95	13.35	0.16	**97**	2.92	20.70	1.12
8	-5.26	12.86	0.09	**53**	-3.05	12.87	0.33	**98**	3.15	21.49	1.37
9	-5.15	11.44	0.14	**54**	-3.58	11.97	0.27	**99**	3.67	20.86	0.84
10	-5.80	11.00	0.23	**55**	-3.49	11.79	0.46	**100**	3.60	21.26	1.06
11	-5.59	12.14	0.26	**56**	-3.63	12.62	0.09	**101**	4.45	22.13	1.04
12	-4.79	12.25	0.15	**57**	-3.32	12.81	0.18	**102**	4.87	21.24	1.42
13	-5.34	11.27	0.51	**58**	-3.83	13.41	0.28	**103**	4.58	21.55	1.37
14	-5.06	12.29	0.23	**59**	-2.83	13.26	0.50	**104**	4.99	22.55	1.25
15	-4.84	12.30	0.03	**60**	-1.69	14.03	0.22	**105**	4.53	21.38	2.28
16	-5.37	11.21	0.38	**61**	-2.32	15.66	0.51	**106**	4.68	21.62	1.56
17	-4.75	11.21	0.34	**62**	-2.02	15.96	0.31	**107**	5.60	22.11	1.43
18	-5.56	11.08	0.16	**63**	-1.62	15.75	0.63	**108**	5.68	21.99	1.87
19	-5.26	10.73	0.26	**64**	-1.17	16.03	0.71	**109**	4.50	23.15	2.24
20	-5.06	11.30	0.22	**65**	-0.95	15.45	0.54	**110**	5.33	23.24	1.30
21	-4.94	12.76	0.11	**66**	-0.76	17.18	0.29	**111**	5.97	22.60	1.34
22	-4.99	11.77	0.12	**67**	-1.18	17.34	0.07	**112**	5.71	23.03	1.10
23	-4.35	12.22	0.15	**68**	-0.82	16.97	0.67	**113**	5.67	23.37	0.60
24	-4.20	13.05	0.16	**69**	-1.17	16.86	0.31	**114**	5.43	22.63	1.19
25	-3.95	13.88	0.08	**70**	0.30	17.89	0.77	**115**	5.61	23.34	1.14
26	-5.15	13.35	0.05	**71**	-0.81	16.95	0.38	**116**	6.24	24.53	1.00
27	-4.56	13.36	0.06	**72**	-0.11	16.87	0.95	**117**	6.00	24.87	0.61
28	-3.82	12.28	0.06	**73**	-0.19	17.87	0.44	**118**	6.70	23.68	1.01
29	-4.49	11.70	0.09	**74**	-0.17	16.87	0.30	**119**	6.42	24.63	0.47
30	-4.94	11.57	0.18	**75**	0.08	18.38	0.41	**120**	7.08	26.04	1.47
31	-4.91	11.50	0.06	**76**	1.02	18.00	0.17	**121**	7.60	25.84	0.40
32	-4.86	11.51	0.14	**77**	0.85	18.09	0.46	**122**	7.29	26.52	0.73
33	-5.15	12.14	0.10	**78**	0.33	16.84	0.74	**123**	8.46	27.26	0.64
34	-3.82	12.55	0.09	**79**	0.66	17.83	1.04	**124**	8.77	26.83	1.10
35	-4.13	12.48	0.33	**80**	0.84	19.89	0.53	**125**	8.48	27.00	1.37
36	-4.06	13.32	0.27	**81**	0.60	19.22	0.54	**126**	8.14	27.80	1.46
37	-4.31	13.16	0.14	**82**	1.40	19.81	0.86	**127**	9.06	27.54	0.81
38	-3.90	13.33	0.27	**83**	1.73	19.59	0.44	**128**	8.82	27.44	0.43
39	-3.62	11.84	0.35	**84**	1.46	20.12	0.55	**129**	9.16	27.47	1.07
40	-3.95	12.90	0.10	**85**	1.56	18.15	0.51	**130**	9.27	27.66	1.30
41	-3.50	11.92	0.21	**86**	1.54	19.34	0.59	**131**	9.35	27.34	1.65
42	-3.93	12.44	0.36	**87**	2.26	20.39	0.91	**132**	9.54	27.87	0.74
43	-3.67	12.68	0.23	**88**	1.39	21.20	0.91	**133**	9.67	27.79	0.68
44	-3.47	12.44	0.09	**89**	2.00	19.31	0.62	**134**	9.96	28.47	0.71
45	-3.69	12.27	0.57	**90**	2.68	20.48	1.39	**135**	10.46	29.03	1.54

Boise City Scenario A1B											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
136	10.61	27.95	0.20	**181**	18.59	34.76	1.86	**226**	18.98	34.38	1.93
137	11.03	28.00	0.95	**182**	18.59	35.21	0.89	**227**	19.12	34.57	0.87
138	11.00	28.30	0.81	**183**	19.34	35.81	1.02	**228**	18.98	34.20	1.91
139	11.37	28.84	0.89	**184**	19.90	35.92	1.65	**229**	19.33	34.49	1.93
140	11.16	29.13	0.92	**185**	19.49	36.19	2.05	**230**	18.99	34.00	1.69
141	11.02	28.14	1.73	**186**	19.64	36.89	2.00	**231**	19.13	34.34	2.82
142	11.72	29.41	1.46	**187**	19.93	36.46	1.12	**232**	19.27	34.13	1.97
143	12.10	29.61	1.53	**188**	20.23	36.69	2.29	**233**	19.20	34.00	2.62
144	11.76	29.57	0.66	**189**	20.19	37.08	1.58	**234**	18.99	34.19	3.99
145	12.39	29.63	0.92	**190**	20.23	36.85	2.25	**235**	18.73	33.98	2.27
146	12.70	30.07	0.66	**191**	20.41	36.59	2.35	**236**	18.63	33.08	2.98
147	12.73	30.39	1.07	**192**	20.79	36.55	1.28	**237**	18.18	33.14	3.64
148	12.98	30.50	0.96	**193**	20.47	36.58	2.08	**238**	17.96	32.70	2.03
149	12.91	30.66	1.18	**194**	20.23	36.92	2.12	**239**	17.94	32.35	1.01
150	13.45	30.60	0.80	**195**	20.12	36.95	1.88	**240**	18.01	32.50	1.10
151	13.85	30.85	1.51	**196**	20.00	37.19	1.65	**241**	17.60	32.34	2.39
152	14.55	30.15	1.64	**197**	20.30	36.44	2.40	**242**	17.41	32.53	1.99
153	14.47	30.99	1.18	**198**	20.53	36.61	1.50	**243**	16.52	31.21	3.15
154	15.02	31.82	3.17	**199**	20.41	37.12	1.76	**244**	15.90	30.36	2.49
155	15.04	31.95	1.17	**200**	20.15	36.38	2.24	**245**	16.08	30.93	1.26
156	14.98	31.77	1.33	**201**	20.49	36.70	1.58	**246**	15.81	31.36	0.80
157	15.26	31.91	1.50	**202**	20.33	36.29	2.50	**247**	15.69	32.51	0.59
158	15.49	31.84	1.44	**203**	20.11	36.36	1.91	**248**	15.64	31.89	1.05
159	15.71	32.01	2.95	**204**	20.07	36.90	2.02	**249**	15.28	31.13	0.74
160	16.25	32.48	1.72	**205**	20.12	37.09	2.00	**250**	15.20	31.46	0.69
161	16.83	32.76	2.45	**206**	20.49	37.26	2.98	**251**	14.85	30.73	1.25
162	16.90	32.72	1.88	**207**	20.29	36.70	2.91	**252**	14.91	30.94	0.89
163	16.77	33.58	1.25	**208**	20.22	36.15	2.78	**253**	14.49	30.56	2.10
164	16.59	33.69	1.89	**209**	19.87	36.49	1.53	**254**	14.69	29.91	1.42
165	17.02	33.76	3.37	**210**	19.77	36.45	2.79	**255**	14.75	30.04	1.80
166	17.28	33.76	1.46	**211**	19.89	36.19	1.18	**256**	14.12	29.47	2.22
167	16.15	33.79	1.82	**212**	19.76	35.54	2.78	**257**	14.55	30.60	0.42
168	16.29	33.84	3.17	**213**	19.68	35.33	3.42	**258**	14.05	30.26	0.83
169	17.00	33.93	1.64	**214**	19.39	35.10	2.71	**259**	14.12	31.11	0.81
170	17.37	34.64	1.32	**215**	19.53	35.33	2.04	**260**	13.69	30.04	2.15
171	17.14	34.12	2.59	**216**	19.59	35.50	2.41	**261**	14.08	29.09	1.75
172	16.86	33.94	1.41	**217**	19.43	34.99	2.07	**262**	14.34	29.39	0.79
173	17.16	33.84	2.47	**218**	19.26	34.92	3.42	**263**	14.24	28.65	0.81
174	17.18	33.82	1.89	**219**	19.51	35.32	1.32	**264**	13.73	29.49	1.35
175	17.29	34.43	1.62	**220**	19.17	35.05	1.70	**265**	13.30	29.73	0.96
176	17.72	34.51	1.87	**221**	19.17	34.89	1.94	**266**	13.70	28.63	1.76
177	17.63	34.51	1.87	**222**	18.76	35.18	2.52	**267**	13.10	27.83	0.89
178	18.05	34.90	1.60	**223**	19.17	34.64	0.83	**268**	12.94	27.51	1.29
179	18.22	34.73	1.90	**224**	18.98	34.71	3.31	**269**	12.60	27.52	1.13
180	18.20	35.02	1.90	**225**	19.23	34.50	1.50	**270**	12.14	27.01	1.03

Boise City Scenario A1B											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
271	11.83	27.50	1.85	**316**	1.45	18.31	0.31	**361**	-4.88	11.25	0.17
272	11.30	26.34	1.69	**317**	1.28	17.84	0.24	**362**	-4.87	11.12	0.27
273	10.72	26.06	1.64	**318**	1.02	18.32	0.50	**363**	-5.03	10.89	0.26
274	10.15	25.59	3.10	**319**	0.75	16.64	0.52	**364**	-4.92	10.57	0.55
275	10.23	26.59	1.47	**320**	0.45	16.85	0.18	**365**	-4.99	12.37	0.33
276	9.54	25.50	2.02	**321**	-0.16	15.79	0.59				
277	9.02	25.45	2.23	**322**	-0.29	15.99	0.32				
278	8.95	24.62	1.57	**323**	-0.62	17.43	0.22				
279	8.64	25.03	2.09	**324**	0.01	17.12	0.31				
280	8.31	25.68	2.66	**325**	-0.32	16.69	0.42				
281	7.83	24.93	1.05	**326**	-1.02	16.31	0.36				
282	7.25	24.86	1.71	**327**	-0.67	15.74	0.09				
283	8.13	24.05	1.19	**328**	-1.09	16.29	0.37				
284	7.38	24.05	0.16	**329**	-1.13	15.94	0.73				
285	7.13	24.17	0.62	**330**	-1.89	15.02	0.41				
286	7.44	24.22	2.01	**331**	-2.04	14.68	0.20				
287	7.59	24.21	0.28	**332**	-2.28	16.11	0.16				
288	6.64	23.37	0.83	**333**	-1.98	14.02	0.14				
289	6.72	23.84	0.68	**334**	-1.90	14.50	0.44				
290	6.51	22.99	0.41	**335**	-2.82	14.85	0.14				
291	6.59	22.61	0.99	**336**	-3.01	12.66	0.21				
292	5.74	22.18	1.64	**337**	-3.84	12.55	0.13				
293	5.56	21.62	1.68	**338**	-4.33	11.69	0.18				
294	5.76	22.76	2.03	**339**	-5.24	10.96	0.48				
295	5.46	22.10	0.63	**340**	-5.49	10.89	0.29				
296	5.00	21.45	0.86	**341**	-4.59	11.82	0.19				
297	4.58	22.40	1.31	**342**	-4.75	10.66	0.39				
298	4.37	20.83	2.03	**343**	-4.52	10.65	0.25				
299	4.51	21.16	0.99	**344**	-4.67	10.28	0.30				
300	3.78	20.91	0.96	**345**	-4.95	11.09	0.09				
301	3.66	20.71	0.62	**346**	-4.70	10.98	0.23				
302	3.51	20.83	0.23	**347**	-5.04	10.60	0.27				
303	3.39	20.32	0.85	**348**	-5.75	10.11	0.30				
304	3.66	19.87	0.20	**349**	-5.90	10.94	0.19				
305	2.75	20.89	0.76	**350**	-5.57	11.65	0.20				
306	2.64	20.29	0.33	**351**	-5.34	11.01	0.22				
307	2.99	19.99	0.71	**352**	-6.10	10.74	0.30				
308	2.19	20.05	0.84	**353**	-5.20	11.07	0.43				
309	2.08	19.58	0.48	**354**	-5.08	10.46	0.15				
310	2.09	20.33	0.62	**355**	-5.16	10.55	0.13				
311	2.16	19.77	0.20	**356**	-5.13	10.63	0.18				
312	2.21	19.07	0.19	**357**	-4.78	11.28	0.23				
313	1.58	18.28	0.32	**358**	-5.20	11.57	0.21				
314	1.41	18.56	0.11	**359**	-4.83	10.78	0.43				
315	1.82	17.66	0.66	**360**	-4.77	9.69	0.29				

Boise City Scenario A2											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
1	-4.91	10.60	0.31	**46**	-4.10	12.48	0.61	**91**	1.91	20.78	0.67
2	-5.51	11.93	0.17	**47**	-3.69	12.37	0.64	**92**	1.91	19.67	0.71
3	-5.72	11.54	0.15	**48**	-3.99	11.30	0.21	**93**	2.11	20.24	1.10
4	-6.05	10.57	0.28	**49**	-4.43	10.96	0.57	**94**	1.98	21.16	1.02
5	-5.27	11.51	0.17	**50**	-3.74	10.75	0.26	**95**	2.34	20.04	1.67
6	-5.21	11.41	0.25	**51**	-4.50	12.59	0.38	**96**	2.77	19.13	1.79
7	-5.41	12.46	0.19	**52**	-4.12	13.17	0.15	**97**	3.10	19.72	1.34
8	-5.26	12.02	0.16	**53**	-3.69	12.59	0.34	**98**	3.42	20.63	2.20
9	-5.19	11.49	0.14	**54**	-3.92	12.16	0.47	**99**	3.38	20.19	0.99
10	-5.94	10.72	0.17	**55**	-4.45	11.73	0.40	**100**	4.22	20.20	0.70
11	-5.64	11.42	0.10	**56**	-4.20	10.73	0.42	**101**	4.22	21.39	1.26
12	-5.46	11.38	0.20	**57**	-3.63	12.11	0.27	**102**	3.78	20.28	1.40
13	-5.71	11.04	0.12	**58**	-4.75	13.41	0.36	**103**	3.74	20.93	1.63
14	-5.58	12.35	0.11	**59**	-3.45	12.69	0.34	**104**	4.62	22.75	1.17
15	-5.47	11.73	0.14	**60**	-1.76	15.29	0.43	**105**	3.87	23.17	1.43
16	-4.95	12.48	0.40	**61**	-2.28	14.90	0.48	**106**	4.02	21.36	1.41
17	-5.11	11.64	0.31	**62**	-2.52	15.31	0.24	**107**	4.27	22.19	1.43
18	-5.48	11.27	0.15	**63**	-1.70	15.27	0.63	**108**	5.10	21.70	0.53
19	-5.81	10.21	0.13	**64**	-1.54	15.36	0.61	**109**	4.46	22.19	2.11
20	-5.34	11.85	0.11	**65**	-1.51	15.97	0.20	**110**	5.40	22.87	1.75
21	-4.73	11.05	0.16	**66**	-1.54	16.81	0.24	**111**	6.10	23.16	1.29
22	-5.35	12.01	0.05	**67**	-1.37	16.87	0.23	**112**	5.66	23.64	1.35
23	-5.01	12.16	0.08	**68**	-0.94	16.19	0.91	**113**	5.63	22.73	0.45
24	-5.14	11.47	0.10	**69**	-0.62	16.27	0.17	**114**	5.63	22.89	1.51
25	-4.69	13.07	0.16	**70**	-0.16	17.42	0.55	**115**	5.74	23.11	0.87
26	-6.04	11.82	0.07	**71**	-0.99	16.89	0.16	**116**	6.30	24.49	0.74
27	-5.11	11.95	0.08	**72**	-0.54	17.36	0.62	**117**	6.38	24.48	0.36
28	-4.86	12.37	0.10	**73**	-0.67	17.27	0.77	**118**	6.44	24.85	1.56
29	-4.79	11.92	0.21	**74**	-0.58	16.62	0.12	**119**	6.52	24.83	1.14
30	-5.82	11.93	0.28	**75**	-0.31	16.73	0.47	**120**	6.65	24.85	1.71
31	-5.76	11.99	0.09	**76**	0.28	16.25	0.30	**121**	7.24	25.61	0.85
32	-4.71	11.18	0.19	**77**	0.83	17.60	0.49	**122**	7.61	26.97	0.65
33	-5.02	11.99	0.18	**78**	-0.03	16.75	0.73	**123**	8.29	26.77	0.76
34	-4.97	12.83	0.06	**79**	-0.16	17.61	0.27	**124**	8.27	27.28	1.53
35	-4.54	12.25	0.27	**80**	-0.50	18.57	0.27	**125**	8.25	27.01	0.60
36	-4.37	12.79	0.25	**81**	0.22	17.99	0.75	**126**	8.43	27.83	1.17
37	-4.46	11.98	0.14	**82**	1.09	19.62	1.06	**127**	9.38	27.42	1.04
38	-3.80	13.10	0.23	**83**	1.02	18.07	0.52	**128**	8.83	27.36	0.63
39	-4.29	12.26	0.20	**84**	1.16	19.62	0.25	**129**	8.99	26.74	1.27
40	-4.99	13.12	0.20	**85**	1.71	19.81	0.42	**130**	9.35	27.09	1.50
41	-4.81	12.24	0.24	**86**	1.55	19.28	0.52	**131**	10.31	28.02	1.24
42	-4.48	12.09	0.31	**87**	1.70	19.68	0.68	**132**	10.05	27.92	0.33
43	-4.41	12.45	0.11	**88**	0.98	20.11	0.82	**133**	10.12	27.53	0.63
44	-4.26	11.78	0.36	**89**	1.21	19.32	1.05	**134**	10.19	27.71	1.37
45	-4.36	10.61	0.69	**90**	1.81	20.75	0.79	**135**	10.28	28.62	0.81

Boise City Scenario A2											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
136	10.92	28.27	0.27	**181**	18.84	35.19	0.79	**226**	18.96	34.33	1.91
137	10.85	28.61	0.47	**182**	18.94	35.12	1.55	**227**	19.02	34.30	2.02
138	10.82	27.28	0.74	**183**	19.26	36.15	1.16	**228**	18.67	34.42	1.75
139	11.17	28.56	1.07	**184**	19.57	37.01	1.31	**229**	19.17	34.29	2.16
140	10.93	29.13	1.38	**185**	19.65	36.42	1.60	**230**	19.12	33.87	2.14
141	10.96	29.20	1.10	**186**	19.98	36.41	0.99	**231**	19.10	33.89	2.76
142	12.16	29.50	0.54	**187**	20.00	36.31	1.48	**232**	19.12	34.09	1.72
143	12.43	29.77	1.68	**188**	20.18	36.31	2.28	**233**	18.83	34.29	2.23
144	11.85	29.66	0.71	**189**	20.34	36.68	2.28	**234**	18.75	33.91	4.19
145	12.46	29.89	0.52	**190**	20.43	36.31	2.14	**235**	18.67	33.59	2.35
146	12.36	29.88	1.07	**191**	20.30	36.21	1.76	**236**	18.76	33.34	3.36
147	12.33	30.71	0.74	**192**	20.51	36.75	1.17	**237**	18.53	33.24	2.27
148	12.96	30.14	0.91	**193**	20.39	36.33	2.26	**238**	18.39	32.89	2.86
149	13.51	30.15	1.17	**194**	20.47	36.41	2.55	**239**	18.14	33.05	1.37
150	13.56	30.89	0.59	**195**	20.22	36.60	1.43	**240**	18.03	32.45	2.19
151	13.96	31.47	1.34	**196**	19.99	36.76	1.51	**241**	17.76	32.81	1.97
152	14.45	31.38	1.89	**197**	20.12	36.50	2.81	**242**	17.39	32.48	2.19
153	14.34	31.41	1.06	**198**	20.27	36.61	1.46	**243**	16.79	31.77	2.04
154	14.87	31.74	1.86	**199**	20.51	37.08	1.44	**244**	16.25	31.07	1.11
155	15.56	32.42	1.50	**200**	20.20	36.75	2.35	**245**	16.27	30.88	1.11
156	15.79	32.37	1.68	**201**	20.41	36.51	2.19	**246**	16.04	31.42	0.89
157	15.91	32.68	1.44	**202**	20.60	36.63	1.83	**247**	15.97	31.72	1.34
158	15.69	31.89	2.52	**203**	20.48	36.64	2.14	**248**	15.52	31.93	0.97
159	16.16	32.16	2.48	**204**	20.29	36.86	2.25	**249**	15.39	31.47	0.85
160	16.30	33.12	0.98	**205**	20.21	37.09	2.52	**250**	15.57	30.96	1.21
161	16.71	33.33	1.22	**206**	20.24	37.09	2.42	**251**	14.66	31.14	1.08
162	16.93	33.91	0.83	**207**	20.36	36.92	2.64	**252**	14.85	30.73	1.80
163	17.11	33.78	1.27	**208**	20.11	36.10	1.70	**253**	14.95	30.24	2.07
164	17.14	34.33	1.42	**209**	19.93	36.46	1.62	**254**	14.66	29.80	1.09
165	17.46	33.83	1.94	**210**	20.06	36.66	1.80	**255**	14.82	29.70	1.09
166	17.36	34.20	1.71	**211**	19.82	36.32	1.47	**256**	14.73	29.57	1.01
167	16.63	34.44	1.86	**212**	19.93	35.42	1.80	**257**	14.85	30.31	1.28
168	16.98	34.37	2.78	**213**	19.62	35.46	3.27	**258**	14.20	29.67	2.08
169	17.21	34.11	2.79	**214**	19.52	35.34	3.38	**259**	14.25	30.09	0.85
170	17.33	34.06	2.20	**215**	19.45	35.18	1.56	**260**	14.53	30.58	1.18
171	17.17	34.38	2.29	**216**	19.49	35.55	1.63	**261**	14.56	29.57	1.43
172	17.29	34.14	1.13	**217**	19.61	35.13	0.87	**262**	14.45	29.09	0.65
173	17.02	33.28	2.02	**218**	19.60	35.25	3.04	**263**	14.58	29.39	1.18
174	17.26	34.10	1.83	**219**	19.57	35.06	1.15	**264**	14.04	29.99	0.88
175	17.63	35.11	1.38	**220**	19.47	34.58	2.08	**265**	13.62	29.40	0.78
176	17.66	34.20	1.98	**221**	19.23	34.91	2.01	**266**	13.94	29.12	1.50
177	17.68	34.60	0.98	**222**	19.10	34.99	1.77	**267**	13.12	28.33	0.49
178	18.34	34.79	2.01	**223**	19.24	34.64	2.22	**268**	12.75	27.72	0.70
179	18.36	34.62	1.42	**224**	19.14	34.65	2.48	**269**	12.86	27.91	1.00
180	18.20	34.95	1.28	**225**	19.47	34.43	0.79	**270**	11.84	27.78	1.04

Boise City Scenario A2											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
271	11.73	28.01	1.08	**316**	0.72	19.13	0.67	**361**	-4.91	11.43	0.30
272	10.99	27.69	0.82	**317**	0.60	17.52	0.16	**362**	-5.73	10.38	0.52
273	11.15	26.70	1.42	**318**	1.01	17.78	0.43	**363**	-5.58	11.27	0.24
274	10.79	26.03	1.74	**319**	0.69	15.72	0.43	**364**	-5.40	11.19	0.43
275	10.45	27.01	1.60	**320**	0.06	17.03	0.19	**365**	-5.38	11.33	0.39
276	9.45	25.52	2.38	**321**	-0.91	16.35	0.63				
277	8.78	25.14	1.91	**322**	-0.67	16.61	0.24				
278	8.77	24.70	1.85	**323**	-1.19	17.09	0.13				
279	8.85	24.51	1.93	**324**	-0.34	16.19	0.27				
280	8.17	25.40	2.34	**325**	-0.91	15.62	0.33				
281	7.95	24.56	0.83	**326**	-0.94	15.86	0.28				
282	7.06	24.27	1.55	**327**	-1.11	15.69	0.09				
283	7.75	23.66	1.67	**328**	-1.19	15.01	0.72				
284	7.62	24.35	0.23	**329**	-1.04	15.04	0.52				
285	7.35	23.78	1.02	**330**	-2.22	13.41	0.17				
286	6.97	23.13	1.93	**331**	-2.65	14.73	0.25				
287	6.81	23.20	0.57	**332**	-2.71	15.39	0.12				
288	6.51	23.14	1.81	**333**	-2.63	14.35	0.24				
289	6.22	23.59	0.41	**334**	-2.83	14.81	0.01				
290	6.25	22.84	0.73	**335**	-3.33	15.26	0.15				
291	6.39	22.93	0.33	**336**	-3.06	12.81	0.44				
292	5.57	22.32	0.09	**337**	-3.95	13.14	0.21				
293	5.42	21.95	1.53	**338**	-4.19	12.10	0.12				
294	5.62	22.36	1.81	**339**	-4.66	10.50	0.28				
295	5.05	21.81	0.26	**340**	-5.05	10.08	0.48				
296	4.70	21.92	0.25	**341**	-4.52	10.32	0.49				
297	5.31	21.94	1.99	**342**	-5.12	10.43	0.45				
298	4.95	20.85	1.09	**343**	-4.70	9.68	0.30				
299	4.01	20.38	1.01	**344**	-5.00	10.25	0.23				
300	3.46	20.60	1.21	**345**	-4.96	10.68	0.21				
301	3.47	21.15	1.01	**346**	-5.18	11.11	0.42				
302	3.34	21.21	0.26	**347**	-4.97	12.03	0.26				
303	2.75	20.01	1.51	**348**	-5.82	11.00	0.35				
304	2.83	20.21	0.80	**349**	-5.60	11.81	0.16				
305	2.98	21.30	0.82	**350**	-5.78	10.69	0.17				
306	2.16	19.61	0.37	**351**	-5.71	11.48	0.30				
307	2.26	18.91	0.74	**352**	-5.95	10.55	0.28				
308	2.19	19.94	0.59	**353**	-5.07	11.18	0.43				
309	1.99	18.50	0.70	**354**	-5.34	10.14	0.17				
310	1.27	19.51	0.33	**355**	-5.42	10.24	0.43				
311	1.35	18.54	0.26	**356**	-5.55	10.77	0.12				
312	1.80	17.86	0.75	**357**	-5.33	11.42	0.33				
313	0.97	18.03	0.89	**358**	-5.09	10.95	0.22				
314	0.44	18.13	0.20	**359**	-5.25	10.44	0.51				
315	1.04	17.76	0.28	**360**	-5.06	10.61	0.41				

Boise City Scenario B1											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
1	-5.39	10.47	0.19	**46**	-5.09	11.52	0.71	**91**	1.55	19.46	0.99
2	-5.54	11.15	0.10	**47**	-4.65	11.60	0.64	**92**	2.00	19.54	0.68
3	-5.16	10.39	0.04	**48**	-4.61	11.49	0.41	**93**	2.03	18.71	1.11
4	-5.60	10.63	0.25	**49**	-4.35	11.37	0.50	**94**	1.33	19.07	1.05
5	-5.05	10.63	0.11	**50**	-4.64	11.65	0.46	**95**	1.83	19.35	1.23
6	-5.26	10.37	0.22	**51**	-5.51	11.97	0.22	**96**	2.70	19.76	1.42
7	-4.97	12.17	0.25	**52**	-4.33	11.81	0.16	**97**	2.25	21.66	1.32
8	-6.09	12.36	0.04	**53**	-3.87	12.51	0.21	**98**	2.44	21.10	1.33
9	-5.78	10.81	0.21	**54**	-4.49	12.33	0.58	**99**	2.63	21.05	1.10
10	-5.72	11.78	0.12	**55**	-4.76	11.90	0.46	**100**	2.98	20.47	1.05
11	-5.24	12.43	0.11	**56**	-4.30	10.58	0.33	**101**	3.17	21.77	0.92
12	-5.40	11.19	0.09	**57**	-3.17	12.08	0.37	**102**	3.12	20.03	0.90
13	-5.37	11.89	0.14	**58**	-3.32	13.12	0.30	**103**	3.74	20.65	1.26
14	-6.00	11.67	0.17	**59**	-3.47	13.00	0.48	**104**	3.94	21.53	1.43
15	-6.42	12.35	0.28	**60**	-2.31	14.36	0.15	**105**	3.66	21.98	1.74
16	-5.28	11.72	0.10	**61**	-2.12	15.05	0.44	**106**	3.85	19.81	1.19
17	-5.96	10.15	0.32	**62**	-2.09	14.35	0.89	**107**	4.13	21.41	2.05
18	-6.31	11.71	0.20	**63**	-2.50	16.08	0.49	**108**	4.05	21.56	1.37
19	-5.69	12.68	0.13	**64**	-2.40	15.53	0.21	**109**	3.33	22.55	1.69
20	-5.65	12.86	0.26	**65**	-1.85	15.18	0.33	**110**	3.83	21.08	1.24
21	-5.63	13.07	0.17	**66**	-1.56	16.11	0.48	**111**	4.71	22.64	1.50
22	-5.80	11.65	0.25	**67**	-2.26	15.33	0.36	**112**	4.86	21.83	1.42
23	-4.95	12.13	0.14	**68**	-1.88	15.66	0.17	**113**	4.97	22.81	2.08
24	-5.03	12.31	0.14	**69**	-1.55	16.06	0.31	**114**	4.93	23.59	1.35
25	-6.02	12.69	0.30	**70**	-1.84	16.30	0.88	**115**	5.85	23.88	0.83
26	-5.84	12.64	0.18	**71**	-1.84	14.88	0.83	**116**	5.57	22.90	1.13
27	-5.33	11.87	0.06	**72**	-0.73	17.10	0.64	**117**	6.03	22.87	1.17
28	-5.77	11.02	0.07	**73**	-0.35	17.90	0.83	**118**	6.60	23.08	2.15
29	-4.91	11.63	0.06	**74**	-1.14	18.03	0.30	**119**	5.48	23.92	1.46
30	-4.48	11.53	0.17	**75**	-0.75	17.19	0.61	**120**	6.34	24.02	1.32
31	-4.76	11.70	0.07	**76**	-0.18	16.58	0.55	**121**	6.66	25.00	0.97
32	-4.72	12.14	0.33	**77**	-0.20	17.52	0.98	**122**	7.04	25.15	0.43
33	-4.72	12.09	0.15	**78**	-0.50	16.66	1.13	**123**	7.53	25.56	0.17
34	-5.10	12.90	0.11	**79**	-0.11	16.26	0.46	**124**	7.83	26.34	0.99
35	-5.72	11.97	0.31	**80**	-0.03	16.66	1.32	**125**	7.52	26.58	1.03
36	-5.05	12.89	0.43	**81**	-0.51	17.75	0.64	**126**	7.59	26.52	0.87
37	-4.28	12.09	0.38	**82**	0.87	18.38	0.65	**127**	7.62	26.51	1.31
38	-4.29	11.72	0.26	**83**	-0.10	18.48	0.69	**128**	8.50	25.95	0.69
39	-3.74	11.65	0.11	**84**	0.55	17.57	0.38	**129**	9.16	27.15	0.95
40	-3.98	12.55	0.32	**85**	0.76	18.67	0.88	**130**	8.49	27.00	0.94
41	-4.09	11.06	0.20	**86**	1.25	19.79	0.84	**131**	8.69	27.76	0.87
42	-4.44	12.48	0.46	**87**	0.57	18.88	1.01	**132**	9.16	26.99	1.27
43	-4.98	12.07	0.16	**88**	0.05	18.96	0.67	**133**	9.08	26.51	1.02
44	-4.30	11.23	0.26	**89**	0.95	20.33	1.13	**134**	9.56	27.82	0.96
45	-4.73	10.64	0.28	**90**	2.12	20.06	0.41	**135**	9.67	28.26	1.22

Boise City Scenario B1											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
136	10.62	27.41	0.96	**181**	17.94	34.99	1.51	**226**	18.99	34.54	1.07
137	10.60	28.03	0.77	**182**	18.44	34.94	1.65	**227**	18.65	34.93	1.68
138	10.14	28.57	1.19	**183**	18.39	34.90	1.87	**228**	18.69	34.48	2.79
139	10.55	29.02	0.83	**184**	18.89	35.68	1.80	**229**	18.78	33.99	2.85
140	10.41	28.56	0.95	**185**	19.30	35.26	1.73	**230**	18.85	33.88	2.50
141	10.63	27.39	1.23	**186**	19.20	35.58	1.64	**231**	18.57	33.74	2.17
142	11.27	28.96	1.14	**187**	19.40	35.71	1.90	**232**	18.67	33.36	1.48
143	11.07	28.78	2.58	**188**	19.37	35.76	2.96	**233**	18.58	33.30	2.21
144	11.71	29.47	1.06	**189**	19.76	36.40	2.43	**234**	18.56	32.94	3.39
145	11.58	28.62	1.56	**190**	19.58	35.47	1.79	**235**	18.39	32.78	2.53
146	11.90	28.73	1.12	**191**	19.72	36.11	1.83	**236**	18.12	32.85	2.88
147	12.21	29.49	1.29	**192**	20.04	36.18	1.92	**237**	17.81	32.88	1.75
148	12.73	30.04	1.02	**193**	19.93	35.17	2.56	**238**	17.79	32.77	1.53
149	13.00	30.03	1.94	**194**	19.90	36.18	2.32	**239**	17.39	32.28	1.86
150	12.70	30.25	0.93	**195**	19.75	36.72	1.73	**240**	17.40	31.56	1.33
151	13.21	30.35	1.40	**196**	19.51	36.49	1.71	**241**	17.25	31.94	1.95
152	13.25	30.74	2.19	**197**	19.49	36.28	1.81	**242**	16.89	32.78	1.14
153	13.61	31.24	0.64	**198**	19.55	36.21	1.69	**243**	16.85	32.04	1.50
154	13.62	31.01	1.39	**199**	19.68	36.15	2.00	**244**	16.24	31.33	1.05
155	14.58	30.80	1.26	**200**	19.77	36.01	2.00	**245**	15.97	31.26	1.19
156	14.98	31.21	2.69	**201**	19.93	35.88	2.36	**246**	15.80	31.34	2.31
157	15.16	31.12	1.93	**202**	19.91	35.89	2.60	**247**	15.29	31.39	0.78
158	15.45	32.14	0.51	**203**	19.93	36.42	2.34	**248**	14.78	31.04	0.84
159	15.48	31.62	2.55	**204**	19.71	36.33	1.68	**249**	15.35	30.39	0.97
160	15.56	32.03	2.31	**205**	19.49	35.99	0.83	**250**	14.73	31.20	1.09
161	15.58	33.14	2.15	**206**	19.32	36.06	2.91	**251**	14.91	31.31	0.80
162	16.47	32.31	1.29	**207**	19.72	36.40	2.38	**252**	14.95	30.77	0.98
163	16.53	32.56	1.81	**208**	19.79	35.87	3.14	**253**	14.58	30.47	1.24
164	16.41	32.90	1.72	**209**	19.53	35.74	1.81	**254**	14.09	30.67	0.72
165	16.78	33.16	1.61	**210**	19.25	35.84	2.25	**255**	14.28	29.64	1.44
166	16.50	33.33	2.18	**211**	19.35	35.77	0.84	**256**	14.38	29.98	0.92
167	16.53	33.34	1.71	**212**	19.25	35.08	1.51	**257**	14.20	30.02	0.96
168	16.25	32.98	3.19	**213**	19.25	34.93	2.95	**258**	14.11	29.21	0.63
169	16.51	33.40	1.38	**214**	19.21	34.71	3.24	**259**	13.79	29.71	1.55
170	16.02	33.17	0.72	**215**	18.98	34.82	3.05	**260**	13.91	29.81	1.47
171	16.74	33.69	1.45	**216**	19.04	35.26	1.47	**261**	14.33	29.89	0.58
172	16.56	33.93	1.84	**217**	19.22	34.74	2.37	**262**	14.53	29.13	0.89
173	16.53	32.78	1.79	**218**	18.73	34.19	2.18	**263**	14.49	28.63	1.26
174	16.05	33.32	1.62	**219**	19.05	34.61	1.53	**264**	13.88	29.40	0.44
175	16.15	33.63	1.67	**220**	18.66	34.97	0.81	**265**	13.55	29.80	1.02
176	16.81	34.10	2.04	**221**	18.86	34.80	1.76	**266**	13.25	28.48	1.42
177	17.02	34.41	1.15	**222**	18.51	34.36	1.30	**267**	12.94	27.92	1.15
178	17.45	34.17	1.50	**223**	18.53	33.93	0.63	**268**	12.84	27.66	0.76
179	17.59	34.31	1.06	**224**	18.54	34.20	1.80	**269**	12.45	27.27	1.48
180	17.57	34.10	1.78	**225**	18.89	34.24	0.79	**270**	12.10	26.71	1.16

Boise City Scenario B1											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
271	12.74	27.23	1.01	**316**	0.54	17.66	0.29	**361**	-6.03	11.29	0.14
272	11.35	27.14	1.86	**317**	0.69	16.29	0.32	**362**	-5.86	10.88	0.19
273	10.67	27.19	1.62	**318**	0.76	17.07	0.35	**363**	-5.40	11.05	0.04
274	9.92	25.96	0.74	**319**	0.36	15.90	0.10	**364**	-5.49	10.67	0.25
275	10.05	25.60	1.09	**320**	-0.70	16.22	0.15	**365**	-5.85	11.42	0.21
276	9.10	23.65	2.75	**321**	-1.15	17.15	0.14				
277	9.18	25.42	1.76	**322**	-0.82	15.34	0.10				
278	8.78	24.71	2.44	**323**	-1.62	15.78	0.17				
279	8.75	24.56	2.86	**324**	-1.43	16.80	0.11				
280	8.44	24.89	1.01	**325**	-0.89	17.39	0.63				
281	7.80	25.09	1.19	**326**	-1.17	15.37	0.25				
282	7.15	24.74	1.19	**327**	-1.56	15.53	0.11				
283	7.90	24.74	0.98	**328**	-1.53	16.00	0.29				
284	7.16	24.16	0.64	**329**	-1.79	14.87	0.40				
285	6.29	23.30	0.35	**330**	-1.90	15.33	0.55				
286	6.43	22.45	1.47	**331**	-2.02	15.68	0.11				
287	6.74	23.79	1.99	**332**	-2.44	13.80	0.14				
288	6.53	23.14	0.58	**333**	-3.23	13.10	0.53				
289	6.19	23.11	0.38	**334**	-2.67	12.42	0.54				
290	5.88	22.83	1.15	**335**	-4.42	14.10	0.40				
291	6.38	22.70	0.93	**336**	-4.23	13.59	0.13				
292	5.58	22.31	0.57	**337**	-4.52	12.64	0.63				
293	4.99	22.46	0.43	**338**	-4.87	11.64	0.26				
294	4.94	22.60	0.95	**339**	-5.26	11.76	0.54				
295	4.49	21.62	1.73	**340**	-5.31	11.52	0.27				
296	4.59	21.34	2.16	**341**	-5.44	11.38	0.15				
297	4.42	21.75	1.41	**342**	-5.06	10.02	0.40				
298	3.90	21.01	2.05	**343**	-4.90	10.43	0.55				
299	4.28	21.33	0.77	**344**	-6.10	8.95	0.32				
300	4.27	21.63	0.82	**345**	-6.16	10.06	0.41				
301	3.97	20.10	0.69	**346**	-5.82	10.64	0.51				
302	3.49	21.44	0.46	**347**	-6.13	9.45	0.34				
303	2.58	20.15	1.89	**348**	-5.66	9.58	0.18				
304	2.66	20.49	0.68	**349**	-5.69	10.40	0.17				
305	2.80	19.39	0.55	**350**	-5.14	10.23	0.19				
306	2.65	19.20	0.39	**351**	-5.23	9.99	0.38				
307	1.98	19.25	0.46	**352**	-5.92	9.64	0.31				
308	2.06	19.18	0.71	**353**	-5.20	10.07	0.15				
309	1.81	17.98	0.07	**354**	-5.20	10.47	0.06				
310	2.01	18.40	0.39	**355**	-5.64	11.01	0.15				
311	2.10	18.14	0.44	**356**	-6.25	9.66	0.44				
312	1.51	18.24	0.47	**357**	-5.53	10.15	0.24				
313	1.17	17.42	0.06	**358**	-6.07	11.10	0.24				
314	1.33	18.03	0.07	**359**	-5.80	10.58	0.41				
315	0.92	17.25	0.54	**360**	-5.43	10.76	0.41				

Goodwell Scenario A1B											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
1	-4.63	10.63	0.73	**46**	-3.99	13.00	0.43	**91**	4.23	21.86	1.21
2	-3.83	11.88	0.30	**47**	-3.23	12.85	0.63	**92**	4.04	21.84	0.55
3	-3.88	12.55	0.17	**48**	-2.82	12.20	0.31	**93**	3.94	22.00	0.86
4	-3.74	12.67	0.11	**49**	-2.47	13.06	0.52	**94**	3.72	22.39	0.31
5	-3.91	12.59	0.44	**50**	-2.96	12.93	0.24	**95**	3.62	22.40	0.94
6	-3.75	12.33	0.26	**51**	-3.82	11.68	0.71	**96**	4.61	21.17	0.39
7	-3.83	12.20	0.24	**52**	-2.62	12.66	0.51	**97**	4.80	21.08	1.02
8	-3.92	11.82	0.35	**53**	-2.73	13.22	0.48	**98**	5.14	21.43	0.90
9	-4.07	12.18	0.10	**54**	-3.27	12.63	0.78	**99**	5.18	21.85	1.27
10	-4.06	12.27	0.09	**55**	-2.31	12.71	0.70	**100**	5.79	21.46	1.19
11	-3.89	12.25	0.16	**56**	-2.56	12.78	0.61	**101**	5.16	21.42	1.04
12	-3.70	11.10	0.35	**57**	-2.77	13.01	0.35	**102**	5.88	23.25	1.24
13	-3.20	12.29	0.19	**58**	-1.10	14.40	0.78	**103**	4.79	22.57	1.38
14	-3.93	12.73	0.13	**59**	-1.36	14.01	0.42	**104**	5.91	22.34	1.02
15	-4.21	12.37	0.21	**60**	-0.87	17.19	0.30	**105**	6.17	23.42	0.65
16	-3.99	11.45	0.16	**61**	-0.49	15.29	0.58	**106**	6.04	22.68	0.62
17	-4.80	12.04	0.37	**62**	-0.94	15.80	1.40	**107**	5.61	24.05	1.22
18	-3.89	13.10	0.11	**63**	-0.42	16.75	1.28	**108**	5.88	24.28	0.71
19	-4.00	12.83	0.07	**64**	0.12	15.66	0.95	**109**	6.84	24.31	1.53
20	-4.00	12.67	0.30	**65**	-0.26	16.89	0.79	**110**	7.00	23.42	0.96
21	-3.98	12.19	0.43	**66**	-0.37	15.80	0.94	**111**	6.40	24.32	1.54
22	-3.85	12.26	0.16	**67**	-0.14	16.74	0.39	**112**	7.86	23.93	1.09
23	-3.88	12.03	0.49	**68**	-0.21	16.79	0.88	**113**	7.56	23.86	0.70
24	-3.84	11.77	0.22	**69**	0.74	16.10	1.19	**114**	7.98	24.92	0.74
25	-3.76	11.00	0.08	**70**	0.19	16.52	0.87	**115**	7.46	25.33	0.88
26	-3.57	12.40	0.28	**71**	0.75	17.53	0.63	**116**	7.77	25.56	1.21
27	-3.62	12.35	0.09	**72**	0.82	18.53	0.86	**117**	8.00	26.15	1.27
28	-3.85	13.01	0.16	**73**	0.39	16.91	0.86	**118**	8.23	25.86	1.00
29	-3.49	12.86	0.14	**74**	1.81	18.36	0.49	**119**	7.83	26.19	0.77
30	-2.95	11.75	0.23	**75**	1.44	18.81	1.01	**120**	8.51	26.21	1.69
31	-3.09	11.12	0.23	**76**	0.98	19.05	0.56	**121**	8.64	26.43	3.65
32	-3.49	13.66	0.27	**77**	1.49	19.13	0.64	**122**	9.11	26.37	1.62
33	-2.89	12.59	0.44	**78**	1.61	18.15	0.73	**123**	8.70	26.86	1.61
34	-3.15	13.04	0.34	**79**	2.17	19.01	0.66	**124**	9.98	27.71	2.05
35	-3.30	14.16	0.72	**80**	2.30	17.95	0.71	**125**	10.15	27.16	1.05
36	-3.37	13.51	0.31	**81**	2.17	18.98	0.69	**126**	10.78	27.50	1.33
37	-3.45	13.10	0.20	**82**	2.27	19.10	1.82	**127**	10.06	27.90	1.73
38	-3.22	13.32	0.47	**83**	2.68	18.72	1.02	**128**	10.45	28.13	2.26
39	-2.93	13.71	0.42	**84**	2.79	20.25	1.25	**129**	10.91	28.19	1.05
40	-3.24	13.28	0.48	**85**	3.30	21.75	0.62	**130**	10.74	27.69	1.43
41	-3.00	12.75	0.30	**86**	3.37	21.51	1.24	**131**	12.13	28.27	1.67
42	-2.34	11.41	0.30	**87**	3.71	19.91	0.83	**132**	11.56	29.08	0.90
43	-2.29	12.52	0.48	**88**	3.71	21.04	0.63	**133**	12.24	28.96	1.22
44	-2.31	12.72	0.35	**89**	2.60	21.39	0.98	**134**	11.73	28.72	1.51
45	-3.28	12.08	0.35	**90**	3.45	21.65	0.71	**135**	12.37	28.30	1.44

Goodwell Scenario A1B											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
136	11.89	28.21	4.07	**181**	19.52	36.32	1.52	**226**	19.84	35.71	2.87
137	12.99	28.79	1.52	**182**	20.43	36.60	1.38	**227**	20.31	36.14	2.15
138	12.92	29.90	0.67	**183**	20.80	37.10	2.07	**228**	20.20	35.79	2.42
139	13.01	29.14	1.56	**184**	20.82	36.91	1.92	**229**	20.03	35.72	1.02
140	13.33	30.28	1.54	**185**	21.14	36.89	1.92	**230**	19.78	35.81	1.48
141	12.55	29.99	2.16	**186**	21.23	37.66	2.21	**231**	20.38	36.23	2.19
142	12.83	29.63	1.45	**187**	21.16	37.72	1.91	**232**	20.38	35.83	1.66
143	13.44	31.01	0.95	**188**	21.52	38.12	1.07	**233**	20.25	35.37	1.61
144	13.70	30.78	1.69	**189**	21.28	38.33	0.85	**234**	20.20	35.53	1.17
145	13.76	30.22	2.61	**190**	21.59	37.95	1.39	**235**	19.97	35.10	1.98
146	13.98	30.95	1.58	**191**	21.52	37.57	1.27	**236**	19.95	35.00	2.01
147	14.56	31.45	1.45	**192**	21.52	37.74	1.85	**237**	19.83	34.91	3.10
148	14.86	31.23	0.92	**193**	21.54	37.81	1.39	**238**	19.46	34.57	2.98
149	15.28	31.58	2.72	**194**	21.56	38.09	1.07	**239**	19.22	34.24	1.62
150	14.79	31.77	1.35	**195**	21.61	37.42	2.57	**240**	18.81	33.95	2.78
151	15.28	32.08	0.93	**196**	22.07	38.11	0.73	**241**	18.58	33.97	2.22
152	15.70	32.59	1.55	**197**	21.57	38.18	0.74	**242**	18.43	34.13	3.56
153	16.29	32.09	1.46	**198**	21.16	37.45	1.62	**243**	17.95	33.52	1.99
154	16.65	32.55	1.38	**199**	21.55	37.79	0.64	**244**	18.19	33.56	1.60
155	16.94	33.23	1.70	**200**	21.85	37.71	2.10	**245**	17.98	33.38	0.90
156	16.91	33.20	1.63	**201**	21.85	37.39	1.35	**246**	17.48	32.97	1.03
157	17.64	33.00	2.00	**202**	21.61	37.88	1.76	**247**	17.20	32.53	1.39
158	18.01	33.80	2.28	**203**	21.71	37.96	1.51	**248**	17.09	32.71	0.75
159	17.49	33.69	2.20	**204**	21.80	38.02	1.04	**249**	17.31	32.90	1.11
160	17.62	34.08	2.32	**205**	21.60	38.00	1.70	**250**	17.06	32.22	1.10
161	17.47	34.18	1.40	**206**	21.71	38.06	1.38	**251**	16.66	32.56	2.37
162	18.40	34.71	1.74	**207**	21.79	37.36	1.94	**252**	16.25	31.82	2.52
163	18.22	33.86	2.12	**208**	21.78	37.91	1.41	**253**	16.55	31.13	1.26
164	17.79	34.04	2.69	**209**	21.56	37.75	0.98	**254**	15.75	31.91	0.80
165	18.33	34.83	1.72	**210**	21.06	37.42	1.27	**255**	15.81	32.51	0.96
166	18.45	35.28	2.29	**211**	21.04	37.12	1.69	**256**	15.74	32.13	0.64
167	18.38	34.84	1.89	**212**	21.14	37.01	1.17	**257**	15.85	31.19	0.54
168	18.36	34.77	2.71	**213**	20.87	36.41	1.64	**258**	15.90	31.59	1.62
169	18.06	34.21	1.59	**214**	21.16	36.61	1.35	**259**	14.98	31.61	0.85
170	18.15	34.55	1.91	**215**	21.03	36.64	0.92	**260**	15.26	31.23	1.22
171	18.73	34.71	1.89	**216**	20.81	36.67	1.95	**261**	15.75	30.19	1.55
172	18.41	35.21	1.34	**217**	20.49	36.54	1.97	**262**	15.24	30.16	1.60
173	18.21	36.03	1.47	**218**	20.53	36.04	1.37	**263**	15.96	30.46	0.28
174	18.47	35.80	2.85	**219**	19.99	35.92	0.73	**264**	15.50	30.73	0.33
175	18.77	35.40	2.52	**220**	20.13	35.55	2.08	**265**	15.00	30.08	1.17
176	19.28	35.32	1.62	**221**	20.51	35.97	2.76	**266**	14.51	30.29	0.82
177	19.26	35.57	2.27	**222**	20.14	36.15	1.63	**267**	14.88	29.10	1.84
178	19.25	35.19	2.02	**223**	20.19	36.08	1.87	**268**	14.65	29.94	1.35
179	19.22	35.53	1.34	**224**	20.46	35.81	1.65	**269**	14.41	29.14	1.58
180	19.33	36.46	1.49	**225**	20.33	36.18	1.25	**270**	13.87	28.36	2.09

Goodwell Scenario A1B											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
271	13.32	27.33	1.65	**316**	1.68	18.04	0.90	**361**	-3.79	11.11	0.10
272	12.89	27.98	1.39	**317**	1.57	18.18	0.50	**362**	-5.03	9.96	0.25
273	12.73	28.02	0.50	**318**	1.35	18.84	0.78	**363**	-4.36	11.71	0.56
274	12.06	26.94	2.17	**319**	1.19	17.66	0.73	**364**	-4.98	11.64	0.17
275	12.15	26.76	2.27	**320**	0.92	17.36	0.30	**365**	-4.54	11.23	0.76
276	11.54	26.60	2.12	**321**	1.29	16.44	0.79				
277	11.26	26.08	2.88	**322**	0.63	16.81	0.50				
278	10.63	25.65	2.21	**323**	0.02	16.77	0.50				
279	9.95	25.11	2.99	**324**	0.45	16.78	0.27				
280	9.75	26.42	2.22	**325**	0.58	16.76	0.24				
281	10.35	26.87	2.37	**326**	-0.03	15.82	0.39				
282	9.39	24.99	1.00	**327**	-0.33	16.63	0.27				
283	9.48	25.67	1.43	**328**	-0.33	15.74	0.27				
284	9.31	25.05	0.93	**329**	-0.19	15.64	0.68				
285	9.33	25.00	1.62	**330**	-0.42	15.04	0.41				
286	8.62	25.08	1.81	**331**	-0.23	13.89	0.34				
287	7.82	24.53	1.74	**332**	-1.11	15.57	0.55				
288	7.11	24.66	0.73	**333**	-1.15	15.19	0.44				
289	7.28	24.21	1.45	**334**	-1.10	13.86	0.22				
290	6.88	23.99	4.24	**335**	-1.85	12.96	0.31				
291	6.78	24.15	2.03	**336**	-2.37	12.13	0.47				
292	6.95	23.24	2.14	**337**	-3.56	11.16	0.24				
293	6.64	23.24	0.76	**338**	-3.60	11.49	0.36				
294	6.88	22.66	1.63	**339**	-3.19	12.05	0.86				
295	6.89	22.39	1.34	**340**	-2.63	12.78	0.46				
296	6.47	22.86	1.87	**341**	-3.70	11.89	0.36				
297	5.84	22.93	1.06	**342**	-3.72	11.50	0.28				
298	5.28	22.78	1.32	**343**	-4.14	11.33	0.80				
299	5.39	22.26	1.43	**344**	-4.28	11.00	0.30				
300	5.72	23.04	0.82	**345**	-4.16	10.89	0.59				
301	5.04	21.87	0.69	**346**	-4.09	10.78	0.25				
302	4.12	21.76	2.60	**347**	-4.14	10.26	0.50				
303	4.41	21.12	1.58	**348**	-4.15	11.00	0.24				
304	4.03	19.29	1.05	**349**	-4.51	11.54	0.30				
305	4.02	19.88	1.31	**350**	-3.98	10.91	0.52				
306	4.38	19.07	1.67	**351**	-4.49	11.05	1.09				
307	4.03	20.88	0.77	**352**	-4.37	11.74	0.24				
308	3.95	20.48	0.83	**353**	-4.53	11.09	0.14				
309	3.06	19.73	0.80	**354**	-4.32	11.32	0.40				
310	2.37	18.68	1.61	**355**	-4.55	10.90	0.41				
311	2.87	19.23	0.71	**356**	-3.74	10.90	0.26				
312	3.31	19.48	0.60	**357**	-3.49	11.09	0.89				
313	3.03	18.92	0.97	**358**	-4.35	10.28	0.50				
314	2.34	19.07	1.05	**359**	-4.23	10.87	0.53				
315	2.16	17.69	0.40	**360**	-4.45	10.16	1.01				

Goodwell Scenario A2											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
1	-4.66	10.95	0.68	**46**	-3.71	12.22	0.40	**91**	4.05	20.53	1.56
2	-3.96	11.01	0.69	**47**	-3.24	12.95	0.46	**92**	3.25	21.33	0.69
3	-4.74	11.37	0.11	**48**	-4.02	12.47	0.22	**93**	3.77	21.32	0.83
4	-4.70	11.56	0.15	**49**	-3.57	12.77	0.43	**94**	3.95	22.12	0.56
5	-4.79	12.52	0.29	**50**	-3.05	11.35	0.48	**95**	3.99	22.76	0.28
6	-4.90	12.35	0.19	**51**	-4.03	11.26	0.61	**96**	3.88	21.24	0.58
7	-4.63	11.75	0.27	**52**	-3.41	12.46	0.43	**97**	4.10	20.46	1.79
8	-4.24	11.09	0.39	**53**	-3.04	12.71	0.34	**98**	4.69	21.55	1.05
9	-4.25	11.81	0.37	**54**	-3.91	11.94	0.29	**99**	4.97	21.52	1.57
10	-4.18	13.09	0.18	**55**	-3.82	12.67	0.21	**100**	5.82	20.88	1.41
11	-4.47	12.25	0.12	**56**	-2.68	12.35	0.43	**101**	5.39	22.20	1.16
12	-4.03	11.98	0.27	**57**	-3.68	12.71	0.58	**102**	5.53	21.75	1.34
13	-4.13	10.57	0.31	**58**	-2.54	13.60	0.87	**103**	5.05	22.58	0.89
14	-4.36	11.73	0.15	**59**	-2.37	12.67	0.31	**104**	6.11	23.61	0.91
15	-5.35	10.72	0.16	**60**	-1.44	16.59	0.24	**105**	5.85	24.04	0.86
16	-4.57	11.62	0.12	**61**	-1.63	15.59	0.84	**106**	6.09	23.19	0.95
17	-4.73	12.11	0.61	**62**	-1.10	15.39	0.74	**107**	5.61	23.31	0.79
18	-4.60	14.04	0.14	**63**	-1.66	15.05	0.66	**108**	5.89	23.70	0.67
19	-4.08	12.18	0.07	**64**	-1.04	15.83	0.66	**109**	5.62	23.82	1.16
20	-4.68	12.30	0.36	**65**	-0.65	15.48	0.65	**110**	6.16	23.33	1.00
21	-4.34	12.19	0.58	**66**	-0.47	16.88	0.87	**111**	6.62	24.64	1.20
22	-4.04	11.93	0.14	**67**	-0.23	17.17	0.99	**112**	7.30	24.95	0.93
23	-4.18	12.32	0.41	**68**	0.01	16.41	1.21	**113**	7.64	24.74	0.84
24	-4.59	12.50	0.26	**69**	-0.04	16.58	1.37	**114**	7.92	24.89	0.78
25	-4.52	10.93	0.16	**70**	-0.19	16.97	0.90	**115**	7.57	25.21	0.78
26	-4.03	12.36	0.31	**71**	0.16	16.51	0.85	**116**	8.34	26.08	0.77
27	-4.30	11.07	0.22	**72**	1.07	17.74	0.80	**117**	8.00	24.63	1.33
28	-4.50	11.65	0.19	**73**	0.91	17.44	1.18	**118**	8.19	24.64	1.69
29	-4.46	12.55	0.16	**74**	1.53	18.66	0.60	**119**	8.16	26.15	1.18
30	-3.87	12.33	0.42	**75**	1.52	17.63	1.32	**120**	8.42	25.55	1.36
31	-3.62	11.78	0.20	**76**	0.82	17.70	1.00	**121**	8.76	26.27	2.95
32	-4.61	11.86	0.31	**77**	0.65	18.61	0.93	**122**	9.23	26.73	1.26
33	-3.48	11.33	0.29	**78**	1.17	17.64	0.88	**123**	9.25	27.54	0.96
34	-3.14	11.10	0.56	**79**	1.94	17.34	1.30	**124**	10.16	26.79	2.28
35	-3.89	12.91	0.55	**80**	1.56	17.69	1.02	**125**	10.28	27.41	1.32
36	-3.13	13.03	0.23	**81**	1.41	18.37	0.92	**126**	11.49	27.26	1.30
37	-3.18	11.89	0.26	**82**	1.74	19.50	1.70	**127**	11.07	27.37	1.73
38	-3.28	11.51	0.43	**83**	2.31	19.72	0.69	**128**	10.33	28.27	2.32
39	-2.79	11.86	0.37	**84**	2.11	19.45	1.54	**129**	11.48	28.06	0.68
40	-3.72	11.38	0.51	**85**	1.92	20.27	0.35	**130**	10.38	27.70	1.13
41	-3.93	12.83	0.35	**86**	2.59	21.22	1.12	**131**	11.95	28.83	1.17
42	-2.93	11.80	0.28	**87**	2.53	19.06	0.67	**132**	11.70	29.34	1.44
43	-2.64	11.67	0.54	**88**	2.78	20.45	0.64	**133**	11.83	28.98	1.77
44	-3.32	11.66	0.41	**89**	2.22	20.71	0.72	**134**	11.64	28.90	1.86
45	-3.06	11.39	0.36	**90**	3.42	21.95	0.37	**135**	12.58	28.37	1.72

Goodwell Scenario A2											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
136	12.36	29.34	1.53	**181**	19.92	36.27	1.56	**226**	20.00	35.75	2.37
137	12.56	28.96	2.62	**182**	20.55	36.50	1.66	**227**	20.59	36.21	1.33
138	12.55	29.59	2.20	**183**	20.54	37.10	2.33	**228**	20.47	36.55	2.82
139	12.36	29.49	1.57	**184**	20.48	36.22	1.61	**229**	20.22	35.82	1.26
140	13.16	30.12	1.33	**185**	21.06	36.55	1.39	**230**	20.09	36.05	1.78
141	12.73	29.93	1.00	**186**	21.12	37.08	2.66	**231**	20.42	35.62	1.59
142	13.57	29.91	1.44	**187**	20.77	37.83	1.30	**232**	20.33	35.17	2.25
143	13.47	30.88	1.33	**188**	21.37	38.09	1.47	**233**	20.55	35.51	1.60
144	13.66	30.33	2.58	**189**	21.64	37.96	0.76	**234**	20.24	35.29	1.58
145	14.35	30.67	2.06	**190**	21.60	37.76	2.81	**235**	20.10	34.91	1.52
146	13.69	31.34	1.22	**191**	21.83	37.91	1.52	**236**	20.18	35.08	2.04
147	14.47	30.92	0.91	**192**	21.55	37.76	2.72	**237**	19.85	34.51	2.44
148	15.41	31.55	0.59	**193**	21.44	37.85	1.57	**238**	19.28	34.27	3.15
149	15.35	31.97	2.74	**194**	21.51	37.60	1.28	**239**	19.51	34.26	2.10
150	15.24	31.37	1.25	**195**	21.29	37.06	2.08	**240**	19.15	34.52	2.34
151	15.69	31.93	1.08	**196**	21.90	38.23	1.66	**241**	18.71	34.41	1.74
152	15.84	32.33	1.82	**197**	21.29	37.97	1.31	**242**	18.57	34.08	3.50
153	16.22	32.50	0.86	**198**	21.30	37.48	1.70	**243**	18.42	33.50	1.51
154	16.65	32.20	1.79	**199**	21.76	38.08	1.34	**244**	18.08	33.09	1.34
155	17.33	32.77	2.34	**200**	21.70	37.92	0.89	**245**	17.89	33.21	0.67
156	16.96	33.73	1.65	**201**	21.80	37.89	1.01	**246**	17.59	32.93	1.41
157	17.59	33.87	1.63	**202**	21.44	38.45	1.51	**247**	17.01	32.75	0.77
158	18.27	34.43	1.66	**203**	21.96	37.86	1.17	**248**	16.71	32.94	0.94
159	18.28	33.93	1.58	**204**	21.87	37.93	1.06	**249**	16.77	32.71	0.62
160	18.20	34.77	2.38	**205**	21.73	38.21	0.92	**250**	17.14	32.32	1.35
161	18.15	34.95	1.81	**206**	21.53	38.29	1.00	**251**	16.91	32.59	1.91
162	18.79	35.00	1.87	**207**	21.57	37.47	1.57	**252**	16.27	32.07	1.77
163	18.33	33.98	1.76	**208**	21.73	37.30	1.29	**253**	16.14	32.09	0.76
164	17.89	35.04	2.07	**209**	21.47	37.47	0.43	**254**	15.58	31.36	1.19
165	18.47	34.46	1.00	**210**	21.10	37.06	1.46	**255**	15.53	32.03	1.20
166	18.65	34.88	2.04	**211**	21.00	37.46	0.78	**256**	16.32	32.55	0.89
167	18.23	34.95	1.49	**212**	20.94	36.81	1.87	**257**	16.02	31.68	0.40
168	18.27	35.14	2.16	**213**	20.76	36.33	1.50	**258**	15.98	31.35	1.15
169	18.65	34.41	1.90	**214**	20.95	36.40	0.86	**259**	15.42	31.38	0.40
170	18.75	34.71	1.23	**215**	21.08	37.00	1.96	**260**	15.18	30.98	1.27
171	18.74	34.73	1.17	**216**	20.79	36.42	1.76	**261**	15.28	30.84	1.02
172	18.86	35.52	1.07	**217**	20.26	36.88	2.42	**262**	15.12	31.20	1.65
173	19.12	35.99	0.77	**218**	20.97	36.00	1.92	**263**	16.19	31.15	0.51
174	19.09	35.53	1.96	**219**	20.45	35.85	1.89	**264**	15.43	30.85	0.69
175	19.13	35.05	2.06	**220**	20.30	35.84	1.46	**265**	15.51	30.76	0.60
176	19.68	35.59	1.31	**221**	20.54	35.92	2.96	**266**	15.27	30.35	1.19
177	19.29	35.68	1.92	**222**	20.64	36.16	1.47	**267**	15.26	29.25	1.27
178	19.59	36.35	1.59	**223**	20.22	36.42	1.98	**268**	14.79	30.25	0.91
179	19.46	35.60	0.96	**224**	20.40	35.49	1.89	**269**	14.60	29.56	0.77
180	19.56	36.42	1.95	**225**	20.19	36.40	1.07	**270**	14.35	29.14	0.87

Goodwell Scenario A2											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
271	14.05	28.48	1.51	**316**	1.78	18.00	0.66	**361**	-4.65	10.71	0.18
272	13.23	27.78	1.32	**317**	1.51	17.85	0.45	**362**	-5.30	9.81	0.12
273	13.12	28.61	0.69	**318**	0.94	17.66	0.94	**363**	-4.61	11.03	0.30
274	12.27	26.12	2.96	**319**	1.35	17.05	0.36	**364**	-4.38	11.55	0.29
275	12.22	26.64	1.62	**320**	1.09	16.92	0.29	**365**	-4.81	10.48	0.79
276	11.74	26.87	2.04	**321**	0.87	17.55	0.78				
277	11.56	26.48	2.96	**322**	0.30	17.01	0.42				
278	11.18	26.35	2.17	**323**	0.58	16.55	0.41				
279	10.75	25.22	1.55	**324**	0.55	16.34	0.21				
280	10.16	25.54	2.31	**325**	0.79	17.05	0.40				
281	10.32	26.88	1.44	**326**	0.43	16.82	0.19				
282	10.13	25.73	2.07	**327**	-0.12	16.36	0.32				
283	9.32	25.82	2.04	**328**	-0.76	14.74	0.28				
284	9.25	24.38	2.15	**329**	-0.52	14.18	0.27				
285	9.08	24.35	2.19	**330**	-1.08	15.46	0.34				
286	8.33	25.18	1.89	**331**	-0.97	13.85	0.52				
287	8.01	23.36	2.96	**332**	-0.76	14.83	0.63				
288	7.53	24.08	1.30	**333**	-0.82	13.99	0.53				
289	7.20	23.13	1.38	**334**	-1.03	14.14	0.64				
290	6.78	23.24	1.42	**335**	-1.99	13.18	0.26				
291	7.23	24.15	2.71	**336**	-3.01	12.11	0.46				
292	7.09	23.57	1.63	**337**	-3.51	12.39	0.40				
293	7.47	23.42	1.10	**338**	-3.14	12.18	0.30				
294	6.57	22.54	0.79	**339**	-3.39	11.89	1.01				
295	6.13	22.19	1.03	**340**	-3.34	11.70	0.36				
296	6.63	23.13	2.77	**341**	-4.12	11.17	0.40				
297	6.53	22.16	1.61	**342**	-4.71	10.08	0.31				
298	5.64	21.46	1.34	**343**	-4.33	10.58	0.31				
299	5.26	21.82	0.69	**344**	-3.74	11.96	0.82				
300	5.23	22.36	1.40	**345**	-4.15	11.54	0.81				
301	5.10	21.48	1.33	**346**	-4.17	9.67	0.39				
302	4.31	21.48	2.52	**347**	-4.30	10.16	0.50				
303	4.46	21.25	1.64	**348**	-4.40	11.42	0.26				
304	4.49	20.09	1.44	**349**	-5.92	10.90	0.23				
305	3.77	19.21	0.72	**350**	-4.78	11.12	0.24				
306	4.03	18.59	2.04	**351**	-4.61	10.60	0.89				
307	4.19	19.95	0.82	**352**	-4.87	11.00	0.34				
308	3.79	20.96	0.66	**353**	-4.65	10.58	0.51				
309	3.44	20.38	0.61	**354**	-5.24	10.72	0.52				
310	2.48	18.88	0.87	**355**	-5.04	10.50	0.27				
311	2.29	19.09	0.69	**356**	-4.46	10.17	0.48				
312	2.60	19.12	0.84	**357**	-4.16	10.04	0.81				
313	3.21	18.51	0.73	**358**	-4.20	9.50	0.48				
314	2.53	18.71	0.65	**359**	-3.79	11.27	0.52				
315	1.91	17.81	0.74	**360**	-4.75	10.78	0.37				

Goodwell Scenario B1											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
1	-4.87	10.73	0.67	**46**	-3.88	12.05	0.39	**91**	3.47	19.96	1.66
2	-4.17	10.80	0.67	**47**	-3.40	12.78	0.46	**92**	2.67	20.75	0.73
3	-4.94	11.17	0.11	**48**	-4.17	12.31	0.21	**93**	3.18	20.73	0.89
4	-4.90	11.36	0.15	**49**	-3.72	12.60	0.43	**94**	3.36	21.52	0.60
5	-4.99	12.33	0.28	**50**	-3.19	11.19	0.48	**95**	3.39	22.16	0.30
6	-5.09	12.16	0.19	**51**	-4.17	11.10	0.61	**96**	3.27	20.62	0.62
7	-4.82	11.56	0.27	**52**	-3.55	12.30	0.43	**97**	3.48	19.84	1.91
8	-4.42	10.91	0.38	**53**	-3.18	12.56	0.34	**98**	4.06	20.91	1.12
9	-4.43	11.64	0.36	**54**	-4.05	11.78	0.29	**99**	4.34	20.89	1.68
10	-4.35	12.94	0.18	**55**	-3.95	12.52	0.22	**100**	5.18	20.24	1.50
11	-4.64	12.09	0.11	**56**	-2.81	12.21	0.44	**101**	4.73	21.55	1.23
12	-4.20	11.83	0.26	**57**	-3.81	12.55	0.59	**102**	4.87	21.08	1.43
13	-4.29	10.42	0.30	**58**	-2.69	13.44	0.89	**103**	4.38	21.91	0.95
14	-4.51	11.58	0.15	**59**	-2.53	12.51	0.31	**104**	5.42	22.92	0.97
15	-5.50	10.58	0.15	**60**	-1.74	16.28	0.24	**105**	5.16	23.35	0.91
16	-4.71	11.48	0.12	**61**	-1.95	15.26	0.87	**106**	5.40	22.49	1.02
17	-4.86	11.97	0.59	**62**	-1.43	15.06	0.77	**107**	4.91	22.61	0.84
18	-4.74	13.90	0.13	**63**	-1.99	14.71	0.68	**108**	5.19	23.00	0.72
19	-4.22	12.03	0.07	**64**	-1.38	15.47	0.69	**109**	4.90	23.11	1.24
20	-4.83	12.16	0.35	**65**	-0.99	15.12	0.68	**110**	5.45	22.61	1.07
21	-4.47	12.05	0.56	**66**	-0.83	16.51	0.91	**111**	5.90	23.93	1.29
22	-4.18	11.80	0.14	**67**	-0.60	16.79	1.03	**112**	6.58	24.22	1.00
23	-4.33	12.18	0.39	**68**	-0.36	16.03	1.27	**113**	6.91	24.00	0.90
24	-4.73	12.35	0.25	**69**	-0.42	16.20	1.43	**114**	7.19	24.15	0.84
25	-4.66	10.78	0.16	**70**	-0.59	16.57	0.95	**115**	6.83	24.47	0.85
26	-4.18	12.21	0.30	**71**	-0.24	16.11	0.90	**116**	7.59	25.33	0.83
27	-4.45	10.92	0.21	**72**	0.67	17.33	0.85	**117**	7.26	23.88	1.43
28	-4.65	11.51	0.18	**73**	0.50	17.02	1.24	**118**	7.44	23.89	1.82
29	-4.61	12.40	0.16	**74**	1.11	18.22	0.63	**119**	7.41	25.40	1.27
30	-4.01	12.18	0.40	**75**	1.08	17.20	1.39	**120**	7.66	24.78	1.46
31	-3.77	11.63	0.20	**76**	0.37	17.27	1.06	**121**	7.99	25.50	3.18
32	-4.76	11.70	0.30	**77**	0.21	18.16	0.98	**122**	8.45	25.94	1.35
33	-3.64	11.17	0.28	**78**	0.72	17.19	0.93	**123**	8.47	26.74	1.03
34	-3.31	10.93	0.54	**79**	1.48	16.89	1.37	**124**	9.37	25.96	2.46
35	-4.06	12.74	0.53	**80**	1.10	17.23	1.07	**125**	9.49	26.58	1.42
36	-3.30	12.86	0.23	**81**	0.92	17.90	0.97	**126**	10.70	26.43	1.40
37	-3.37	11.72	0.26	**82**	1.26	19.02	1.80	**127**	10.27	26.51	1.87
38	-3.47	11.34	0.43	**83**	1.81	19.23	0.73	**128**	9.53	27.42	2.50
39	-2.96	11.69	0.36	**84**	1.60	18.95	1.63	**129**	10.66	27.22	0.74
40	-3.88	11.21	0.50	**85**	1.40	19.75	0.37	**130**	9.55	26.86	1.22
41	-4.10	12.66	0.34	**86**	2.07	20.70	1.19	**131**	11.13	27.97	1.27
42	-3.11	11.64	0.28	**87**	2.00	18.53	0.71	**132**	10.89	28.47	1.56
43	-2.82	11.50	0.53	**88**	2.25	19.92	0.68	**133**	11.00	28.13	1.91
44	-3.49	11.50	0.40	**89**	1.67	20.17	0.77	**134**	10.80	28.03	2.01
45	-3.22	11.22	0.35	**90**	2.86	21.38	0.39	**135**	11.74	27.51	1.86

Goodwell Scenario B1											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
136	11.51	28.49	1.65	**181**	19.23	35.59	1.74	**226**	19.60	35.35	2.24
137	11.71	28.14	2.82	**182**	19.89	35.84	1.72	**227**	20.18	35.80	1.27
138	11.70	28.77	2.38	**183**	19.90	36.44	2.52	**228**	20.07	36.15	2.68
139	11.53	28.68	1.69	**184**	19.86	35.60	1.71	**229**	19.82	35.41	1.18
140	12.33	29.31	1.44	**185**	20.46	35.94	1.46	**230**	19.68	35.65	1.65
141	11.89	29.12	1.08	**186**	20.53	36.48	2.97	**231**	20.02	35.22	1.45
142	12.74	29.11	1.56	**187**	20.18	37.25	1.39	**232**	19.94	34.78	2.07
143	12.65	30.09	1.44	**188**	20.78	37.52	1.57	**233**	20.16	35.13	1.44
144	12.84	29.54	2.79	**189**	21.07	37.38	0.79	**234**	19.84	34.91	1.39
145	13.52	29.88	2.22	**190**	21.03	37.19	3.09	**235**	19.71	34.53	1.35
146	12.85	30.54	1.32	**191**	21.27	37.34	1.64	**236**	19.79	34.70	1.85
147	13.64	30.12	0.98	**192**	20.99	37.18	2.94	**237**	19.47	34.15	2.13
148	14.59	30.75	0.63	**193**	20.87	37.29	1.68	**238**	18.90	33.90	2.81
149	14.53	31.16	2.96	**194**	20.94	37.03	1.37	**239**	19.14	33.89	1.80
150	14.42	30.57	1.35	**195**	20.72	36.49	2.21	**240**	18.79	34.18	1.97
151	14.87	31.13	1.16	**196**	21.33	37.67	1.76	**241**	18.36	34.07	1.45
152	15.02	31.50	2.02	**197**	20.72	37.41	1.39	**242**	18.22	33.74	2.96
153	15.37	31.64	0.96	**198**	20.74	36.90	1.79	**243**	18.08	33.16	1.22
154	15.80	31.32	1.99	**199**	21.19	37.51	1.42	**244**	17.76	32.76	1.21
155	16.47	31.88	2.60	**200**	21.14	37.36	0.92	**245**	17.57	32.88	0.60
156	16.09	32.85	1.84	**201**	21.24	37.32	1.05	**246**	17.27	32.60	1.27
157	16.73	32.97	1.82	**202**	20.87	37.89	1.56	**247**	16.70	32.43	0.70
158	17.42	33.53	1.84	**203**	21.40	37.30	1.20	**248**	16.40	32.61	0.85
159	17.43	33.03	1.76	**204**	21.30	37.37	1.06	**249**	16.47	32.38	0.56
160	17.36	33.89	2.65	**205**	21.17	37.64	0.92	**250**	16.85	32.00	1.22
161	17.31	34.07	2.01	**206**	20.98	37.73	1.00	**251**	16.63	32.28	1.73
162	17.97	34.14	2.08	**207**	21.02	36.92	1.57	**252**	16.00	31.77	1.61
163	17.51	33.14	1.96	**208**	21.18	36.75	1.30	**253**	15.87	31.79	0.69
164	17.09	34.22	2.30	**209**	20.93	36.94	0.41	**254**	15.32	31.07	1.08
165	17.67	33.65	1.12	**210**	20.57	36.53	1.43	**255**	15.27	31.75	1.09
166	17.85	34.07	2.27	**211**	20.49	36.94	0.73	**256**	16.07	32.28	0.80
167	17.44	34.16	1.65	**212**	20.44	36.32	1.85	**257**	15.77	31.41	0.36
168	17.48	34.35	2.40	**213**	20.28	35.85	1.37	**258**	15.72	31.08	1.05
169	17.86	33.63	2.12	**214**	20.49	35.93	0.76	**259**	15.17	31.12	0.36
170	17.98	33.93	1.37	**215**	20.62	36.54	1.82	**260**	14.93	30.75	1.15
171	17.97	33.98	1.30	**216**	20.33	35.96	1.68	**261**	15.02	30.61	0.92
172	18.09	34.76	1.19	**217**	19.81	36.42	2.27	**262**	14.88	30.97	1.49
173	18.37	35.25	0.86	**218**	20.53	35.55	1.79	**263**	15.95	30.93	0.47
174	18.34	34.79	2.18	**219**	20.02	35.41	1.75	**264**	15.20	30.64	0.62
175	18.40	34.33	2.29	**220**	19.88	35.41	1.35	**265**	15.28	30.55	0.54
176	18.95	34.89	1.46	**221**	20.13	35.49	2.80	**266**	15.05	30.15	1.08
177	18.57	34.98	2.14	**222**	20.23	35.75	1.37	**267**	15.04	29.05	1.15
178	18.88	35.64	1.77	**223**	19.80	36.00	1.88	**268**	14.58	30.06	0.83
179	18.76	34.91	1.06	**224**	19.99	35.07	1.78	**269**	14.39	29.37	0.70
180	18.86	35.73	2.17	**225**	19.78	35.99	1.00	**270**	14.15	28.95	0.79

Goodwell Scenario B1											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
271	13.85	28.29	1.36	**316**	1.52	17.72	0.71	**361**	-4.94	10.43	0.18
272	13.03	27.58	1.20	**317**	1.24	17.57	0.48	**362**	-5.57	9.55	0.12
273	12.92	28.41	0.62	**318**	0.67	17.38	1.01	**363**	-4.87	10.77	0.31
274	12.07	25.92	2.95	**319**	1.07	16.77	0.40	**364**	-4.64	11.30	0.30
275	12.02	26.44	1.61	**320**	0.80	16.64	0.32	**365**	-5.03	10.25	0.81
276	11.54	26.67	2.03	**321**	0.59	17.26	0.85				
277	11.36	26.29	2.95	**322**	0.01	16.73	0.46				
278	10.99	26.17	2.16	**323**	0.29	16.26	0.44				
279	10.56	25.03	1.54	**324**	0.27	16.06	0.23				
280	9.97	25.36	2.30	**325**	0.50	16.77	0.43				
281	10.13	26.70	1.43	**326**	0.14	16.53	0.20				
282	9.96	25.57	2.06	**327**	-0.41	16.09	0.35				
283	9.15	25.65	2.03	**328**	-1.05	14.46	0.30				
284	9.09	24.22	2.14	**329**	-0.80	13.90	0.29				
285	8.92	24.19	2.18	**330**	-1.37	15.18	0.37				
286	8.18	25.03	1.88	**331**	-1.26	13.57	0.56				
287	7.85	23.19	2.94	**332**	-1.06	14.54	0.67				
288	7.37	23.93	1.29	**333**	-1.11	13.70	0.57				
289	7.05	22.99	1.37	**334**	-1.33	13.85	0.69				
290	6.61	23.09	1.41	**335**	-2.29	12.88	0.28				
291	7.08	23.98	2.69	**336**	-3.31	11.81	0.49				
292	6.93	23.41	1.62	**337**	-3.81	12.09	0.43				
293	7.30	23.25	1.09	**338**	-3.43	11.88	0.32				
294	6.39	22.36	0.78	**339**	-3.69	11.59	1.08				
295	5.95	22.01	1.03	**340**	-3.64	11.40	0.39				
296	6.44	22.94	2.75	**341**	-4.42	10.87	0.43				
297	6.34	21.97	1.59	**342**	-5.01	9.78	0.33				
298	5.45	21.27	1.33	**343**	-4.64	10.28	0.33				
299	5.07	21.62	0.69	**344**	-4.04	11.65	0.87				
300	5.04	22.16	1.40	**345**	-4.46	11.24	0.86				
301	4.90	21.28	1.32	**346**	-4.48	9.37	0.41				
302	4.11	21.27	2.50	**347**	-4.61	9.85	0.53				
303	4.25	21.04	1.64	**348**	-4.71	11.12	0.27				
304	4.26	19.86	1.43	**349**	-6.22	10.60	0.24				
305	3.56	18.99	0.73	**350**	-5.08	10.82	0.25				
306	3.81	18.37	2.09	**351**	-4.91	10.30	0.94				
307	3.95	19.72	0.84	**352**	-5.17	10.69	0.36				
308	3.56	20.73	0.68	**353**	-4.96	10.28	0.54				
309	3.21	20.13	0.64	**354**	-5.54	10.42	0.55				
310	2.23	18.63	0.91	**355**	-5.35	10.19	0.28				
311	2.05	18.83	0.73	**356**	-4.76	9.86	0.51				
312	2.35	18.85	0.88	**357**	-4.46	9.74	0.85				
313	2.94	18.24	0.77	**358**	-4.50	9.20	0.50				
314	2.26	18.45	0.69	**359**	-4.08	10.98	0.54				
315	1.66	17.53	0.79	**360**	-5.04	10.49	0.38				

Hooker Scenario A1B											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
1	-5.23	12.31	0.29	**46**	-3.34	12.77	0.27	**91**	3.39	20.46	1.29
2	-4.99	10.38	0.24	**47**	-3.50	13.29	0.35	**92**	4.17	21.12	1.14
3	-4.41	11.79	0.40	**48**	-3.55	11.85	0.41	**93**	4.41	22.72	0.26
4	-4.15	11.97	0.09	**49**	-3.84	13.44	0.50	**94**	4.68	22.87	0.87
5	-5.09	11.41	0.06	**50**	-2.78	14.74	0.36	**95**	4.70	21.60	0.49
6	-5.23	11.22	0.17	**51**	-3.42	13.90	0.27	**96**	3.86	21.62	0.67
7	-4.80	11.24	0.38	**52**	-3.18	12.93	0.33	**97**	5.04	22.63	1.06
8	-4.08	11.18	0.59	**53**	-2.78	13.09	0.73	**98**	5.07	22.26	1.52
9	-4.30	11.96	0.41	**54**	-2.14	13.96	0.30	**99**	4.78	22.87	1.38
10	-4.05	12.53	0.16	**55**	-2.48	15.08	0.11	**100**	5.52	23.87	0.40
11	-4.81	12.80	0.31	**56**	-2.18	13.69	0.28	**101**	5.43	22.93	0.86
12	-4.90	11.99	0.43	**57**	-2.12	13.31	0.52	**102**	5.78	22.34	1.32
13	-4.58	12.90	0.23	**58**	-2.29	14.25	0.40	**103**	5.61	23.70	1.90
14	-4.62	12.52	0.25	**59**	-1.98	14.97	0.68	**104**	5.68	22.90	0.66
15	-5.30	12.27	0.11	**60**	-0.37	17.20	0.80	**105**	6.24	23.15	1.01
16	-5.01	12.94	0.64	**61**	-0.87	16.89	0.82	**106**	5.88	22.88	0.66
17	-4.73	12.97	0.35	**62**	-0.73	15.86	0.89	**107**	6.19	23.01	0.88
18	-4.76	12.55	0.30	**63**	-0.42	16.03	0.40	**108**	6.53	22.95	1.07
19	-4.27	12.14	0.15	**64**	0.03	17.31	1.08	**109**	7.46	24.78	1.09
20	-4.42	10.96	0.30	**65**	0.07	17.58	0.38	**110**	7.47	22.71	1.53
21	-4.58	12.32	0.26	**66**	0.22	16.97	0.91	**111**	8.02	24.08	1.77
22	-4.30	13.09	0.24	**67**	0.24	16.93	1.16	**112**	7.13	25.27	1.66
23	-4.05	11.90	0.37	**68**	-0.47	17.50	0.27	**113**	7.08	25.50	1.69
24	-4.08	12.10	0.60	**69**	0.22	17.45	0.29	**114**	7.92	24.56	0.65
25	-4.24	12.47	0.83	**70**	0.64	17.21	1.06	**115**	8.23	25.36	1.33
26	-3.95	13.30	0.24	**71**	0.77	17.31	0.83	**116**	9.01	26.11	0.22
27	-4.42	12.53	0.08	**72**	1.15	17.43	2.33	**117**	8.44	25.38	0.81
28	-4.15	12.06	0.40	**73**	1.20	18.14	0.71	**118**	9.29	25.64	1.36
29	-4.22	13.93	0.17	**74**	1.17	18.14	1.07	**119**	9.05	25.43	1.48
30	-4.34	12.85	0.78	**75**	1.28	17.78	1.36	**120**	8.73	25.75	1.82
31	-4.17	13.24	0.17	**76**	1.58	18.38	1.05	**121**	9.20	27.90	0.41
32	-4.54	13.36	0.41	**77**	1.41	19.19	0.61	**122**	10.02	27.52	2.11
33	-4.00	13.77	0.24	**78**	1.78	20.16	1.27	**123**	9.14	28.31	1.79
34	-3.55	12.41	0.34	**79**	2.09	18.78	1.65	**124**	9.76	28.79	0.91
35	-3.66	12.63	0.19	**80**	2.32	19.00	1.30	**125**	10.19	28.31	1.36
36	-3.15	14.04	0.06	**81**	2.22	18.87	1.36	**126**	10.49	27.71	1.08
37	-3.13	12.21	0.26	**82**	1.97	18.57	0.56	**127**	9.74	28.46	1.23
38	-3.32	12.00	0.42	**83**	2.18	19.17	0.56	**128**	10.68	28.45	0.70
39	-4.52	12.70	0.31	**84**	3.00	20.34	0.74	**129**	10.77	28.75	1.24
40	-3.33	12.56	0.40	**85**	3.16	20.05	0.72	**130**	11.25	28.58	2.82
41	-3.04	12.60	0.08	**86**	3.57	20.65	0.96	**131**	11.37	29.47	2.04
42	-3.56	12.41	0.16	**87**	3.45	18.97	1.08	**132**	11.27	29.26	2.41
43	-2.98	12.55	0.44	**88**	3.37	19.16	0.80	**133**	12.16	29.45	1.77
44	-3.11	12.22	0.33	**89**	3.61	21.40	0.63	**134**	11.28	29.11	2.45
45	-3.44	12.19	0.54	**90**	4.34	21.55	0.72	**135**	12.10	29.21	1.73

Hooker Scenario A1B											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
136	11.55	29.12	2.33	**181**	19.84	36.75	2.78	**226**	20.93	35.52	1.80
137	11.99	29.40	1.99	**182**	20.31	36.86	2.71	**227**	21.00	35.91	2.28
138	12.77	29.63	3.58	**183**	20.75	37.47	1.11	**228**	20.94	36.46	3.38
139	12.64	29.65	2.53	**184**	21.42	36.95	1.22	**229**	20.72	36.73	0.76
140	12.61	30.36	0.51	**185**	21.90	37.90	1.92	**230**	20.59	36.85	0.93
141	13.35	30.03	0.60	**186**	21.94	38.38	1.23	**231**	20.42	36.47	0.82
142	13.57	30.80	1.16	**187**	22.15	38.58	1.88	**232**	20.70	36.65	1.28
143	13.62	30.24	2.08	**188**	21.89	38.61	1.85	**233**	20.77	36.46	0.70
144	14.14	30.88	1.03	**189**	21.78	39.14	2.73	**234**	20.60	36.47	0.95
145	14.13	32.14	1.63	**190**	22.23	39.28	1.64	**235**	20.51	36.70	1.22
146	13.97	32.38	1.15	**191**	21.96	38.69	2.62	**236**	20.45	36.56	2.08
147	14.37	32.01	1.44	**192**	21.79	38.42	2.14	**237**	20.62	35.18	0.97
148	15.06	32.04	1.07	**193**	22.45	38.33	2.12	**238**	20.13	35.47	2.02
149	14.90	32.87	2.15	**194**	22.16	39.07	2.83	**239**	20.17	35.78	1.58
150	15.31	32.52	0.94	**195**	21.93	38.61	2.13	**240**	19.40	35.25	1.12
151	15.54	32.84	1.27	**196**	22.11	39.07	2.52	**241**	19.37	35.31	2.31
152	16.14	33.53	1.63	**197**	22.36	38.76	2.84	**242**	19.13	35.22	0.85
153	16.24	32.79	1.59	**198**	22.15	38.68	2.28	**243**	19.10	35.05	1.18
154	16.80	33.38	0.80	**199**	22.24	39.21	0.80	**244**	18.46	35.20	0.61
155	17.32	33.60	0.86	**200**	22.53	39.22	1.32	**245**	18.00	34.16	0.49
156	17.11	33.53	1.11	**201**	22.28	38.86	2.19	**246**	17.57	33.79	1.50
157	16.99	33.53	0.91	**202**	22.15	39.08	1.10	**247**	17.38	33.85	1.71
158	17.55	34.03	2.39	**203**	22.19	38.78	1.30	**248**	16.93	33.25	0.74
159	17.87	34.85	0.68	**204**	21.97	38.93	1.30	**249**	17.14	32.69	0.71
160	18.44	34.94	1.06	**205**	22.05	39.01	1.16	**250**	16.91	33.54	0.37
161	18.61	35.13	2.07	**206**	22.04	39.08	1.59	**251**	16.75	33.03	0.94
162	18.48	35.08	1.32	**207**	21.88	38.80	1.14	**252**	16.28	32.60	1.08
163	18.88	35.66	1.44	**208**	22.27	37.91	2.83	**253**	16.59	32.38	0.70
164	18.97	35.71	0.63	**209**	21.92	38.36	1.22	**254**	16.03	32.04	1.04
165	18.79	34.68	2.38	**210**	21.67	39.05	1.78	**255**	16.53	31.67	0.98
166	18.90	35.51	2.80	**211**	21.45	38.75	1.16	**256**	15.90	32.80	0.53
167	18.13	35.29	2.33	**212**	21.39	37.64	2.63	**257**	16.20	32.33	0.48
168	18.67	35.95	0.70	**213**	21.35	37.86	1.15	**258**	16.52	32.00	0.66
169	18.57	35.73	1.90	**214**	21.00	37.77	1.42	**259**	15.76	31.84	0.91
170	18.94	35.66	2.74	**215**	20.96	38.09	0.88	**260**	15.87	32.09	1.11
171	19.14	36.12	2.21	**216**	21.06	37.26	2.38	**261**	15.75	31.87	0.47
172	19.10	35.73	1.79	**217**	21.32	37.06	3.26	**262**	15.55	31.45	0.89
173	18.89	35.74	1.83	**218**	21.07	37.10	3.00	**263**	14.95	31.19	2.10
174	18.63	36.32	0.77	**219**	21.00	36.76	2.17	**264**	15.23	31.88	0.59
175	19.30	35.90	0.95	**220**	20.89	37.27	3.01	**265**	15.14	31.17	1.17
176	19.43	35.75	1.43	**221**	20.69	37.07	2.36	**266**	15.44	30.59	1.29
177	19.33	36.56	1.67	**222**	20.92	37.25	2.01	**267**	15.53	30.30	0.62
178	19.62	36.76	2.65	**223**	20.80	37.28	0.48	**268**	14.55	28.77	0.44
179	19.90	36.93	2.15	**224**	20.88	37.20	1.76	**269**	14.05	29.03	0.55
180	20.14	36.56	2.56	**225**	20.78	36.41	0.81	**270**	13.03	29.43	0.73

Hooker Scenario A1B											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
271	13.25	29.20	1.23	**316**	2.58	18.82	0.55	**361**	-3.86	11.73	0.56
272	13.09	29.22	0.76	**317**	1.59	18.52	0.44	**362**	-4.04	12.29	0.27
273	12.74	29.00	0.25	**318**	1.48	18.66	0.84	**363**	-4.90	11.19	0.24
274	11.61	27.96	1.02	**319**	0.84	18.09	0.56	**364**	-4.41	10.41	0.37
275	11.42	27.54	2.12	**320**	1.14	17.83	0.65	**365**	-4.41	11.02	0.30
276	10.94	27.69	1.62	**321**	0.62	17.35	0.80				
277	11.03	27.63	1.47	**322**	0.65	17.06	0.32				
278	10.70	27.95	1.61	**323**	0.48	17.51	0.25				
279	10.42	27.40	2.26	**324**	0.31	16.97	0.85				
280	10.78	26.87	1.20	**325**	-0.01	17.44	0.15				
281	9.81	26.53	1.15	**326**	-0.11	15.52	0.28				
282	9.64	26.90	0.87	**327**	-0.29	14.90	0.89				
283	9.39	25.58	0.97	**328**	-0.27	16.37	0.19				
284	9.44	25.22	0.94	**329**	-0.60	15.98	0.88				
285	8.23	25.86	0.69	**330**	-0.19	15.68	0.31				
286	7.72	25.58	1.11	**331**	-1.36	15.70	0.35				
287	7.89	24.53	0.53	**332**	-2.00	15.15	0.17				
288	7.90	25.04	1.08	**333**	-1.58	15.73	0.32				
289	7.49	24.36	2.33	**334**	-0.97	14.19	0.93				
290	7.12	24.70	2.68	**335**	-1.76	14.57	0.40				
291	7.75	24.29	1.04	**336**	-3.17	13.77	0.53				
292	7.06	23.86	1.67	**337**	-3.11	12.15	0.51				
293	6.71	23.44	1.60	**338**	-4.32	12.19	1.15				
294	6.83	24.51	1.30	**339**	-3.97	11.54	0.59				
295	6.76	24.11	0.38	**340**	-3.99	11.45	0.28				
296	6.45	22.52	0.62	**341**	-4.16	10.77	1.05				
297	6.40	23.35	1.11	**342**	-4.73	11.62	0.06				
298	5.52	21.01	2.34	**343**	-4.45	11.27	0.25				
299	5.46	22.59	1.19	**344**	-4.98	11.64	0.74				
300	5.77	23.03	0.63	**345**	-5.41	10.40	1.13				
301	5.25	21.83	1.56	**346**	-4.91	10.35	1.09				
302	5.40	21.73	1.28	**347**	-4.78	10.92	0.27				
303	4.79	20.41	1.79	**348**	-4.01	10.58	1.11				
304	4.22	20.36	1.50	**349**	-4.01	11.59	1.04				
305	4.47	20.46	0.41	**350**	-4.23	11.23	0.27				
306	4.72	20.94	1.02	**351**	-4.02	11.80	0.33				
307	4.37	19.49	0.99	**352**	-4.36	10.98	0.47				
308	4.49	19.56	1.02	**353**	-5.48	10.63	0.59				
309	3.73	19.99	0.65	**354**	-5.13	9.72	0.55				
310	3.29	20.46	0.38	**355**	-4.53	10.21	0.30				
311	3.07	20.23	0.04	**356**	-3.66	10.35	0.25				
312	2.97	19.49	0.44	**357**	-3.59	10.16	0.43				
313	2.38	19.03	1.78	**358**	-4.87	10.40	1.24				
314	1.69	18.99	0.71	**359**	-4.78	12.52	0.24				
315	2.41	17.67	0.71	**360**	-4.40	11.20	0.42				

Hooker Scenario A2											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
1	-5.61	11.88	0.47	**46**	-3.59	12.62	0.37	**91**	2.66	20.35	1.33
2	-5.49	9.84	0.54	**47**	-4.01	12.30	0.47	**92**	3.91	20.37	1.15
3	-4.90	11.18	0.20	**48**	-3.93	11.12	0.51	**93**	3.85	22.96	0.37
4	-4.96	11.35	0.09	**49**	-4.44	12.61	0.58	**94**	4.49	22.34	0.56
5	-5.68	11.02	0.16	**50**	-3.49	14.25	0.32	**95**	4.30	21.37	0.81
6	-5.74	10.54	0.30	**51**	-3.72	13.25	0.36	**96**	3.88	21.22	0.58
7	-5.56	10.56	0.52	**52**	-3.96	11.86	0.48	**97**	5.05	22.57	0.98
8	-4.71	10.56	0.26	**53**	-3.70	12.48	0.73	**98**	4.75	22.33	1.56
9	-4.92	12.08	0.25	**54**	-3.18	12.74	0.49	**99**	4.48	22.57	1.46
10	-4.59	12.59	0.25	**55**	-3.38	14.39	0.07	**100**	5.40	23.20	0.72
11	-5.16	12.73	0.33	**56**	-3.38	12.71	0.60	**101**	4.97	23.19	1.20
12	-5.12	11.70	0.50	**57**	-3.04	13.14	0.49	**102**	5.46	22.62	1.21
13	-4.75	12.61	0.15	**58**	-3.06	13.35	0.37	**103**	5.66	24.03	1.96
14	-5.14	11.18	0.25	**59**	-2.98	13.99	0.73	**104**	5.62	23.27	0.82
15	-5.68	11.02	0.16	**60**	-0.59	16.67	1.25	**105**	6.30	23.87	0.99
16	-5.56	12.20	0.80	**61**	-1.31	16.13	0.89	**106**	6.24	23.12	1.20
17	-5.27	11.64	0.31	**62**	-1.53	15.44	0.78	**107**	6.30	23.32	1.16
18	-5.33	12.43	0.34	**63**	-1.35	15.79	0.53	**108**	6.69	23.05	1.12
19	-4.82	11.84	0.19	**64**	-0.96	16.70	1.16	**109**	7.12	24.70	0.85
20	-4.97	10.23	0.53	**65**	-0.73	15.61	0.80	**110**	7.26	22.85	1.18
21	-4.99	11.38	0.38	**66**	-0.32	16.11	0.51	**111**	8.04	24.67	1.83
22	-4.94	12.11	0.15	**67**	-0.27	16.21	1.10	**112**	7.10	25.48	1.19
23	-4.69	11.41	0.46	**68**	-0.93	17.12	0.31	**113**	7.09	24.80	1.88
24	-5.28	11.40	0.69	**69**	-0.34	17.40	0.25	**114**	7.87	25.02	0.68
25	-5.28	11.34	0.94	**70**	-0.35	16.94	1.00	**115**	8.51	25.48	1.56
26	-4.58	12.85	0.30	**71**	0.55	17.11	1.20	**116**	8.89	25.73	0.76
27	-5.27	12.18	0.15	**72**	0.74	16.50	2.67	**117**	8.49	25.24	0.84
28	-5.00	10.90	0.39	**73**	0.69	16.57	0.90	**118**	9.28	25.59	0.95
29	-4.62	13.16	0.18	**74**	0.28	17.25	1.51	**119**	9.19	25.47	1.78
30	-4.98	12.92	0.64	**75**	1.01	17.72	1.07	**120**	8.89	26.38	1.94
31	-4.98	13.19	0.09	**76**	1.58	18.11	1.31	**121**	9.28	28.01	0.34
32	-5.06	12.77	0.55	**77**	0.99	18.61	0.45	**122**	9.88	28.52	1.64
33	-4.40	13.30	0.14	**78**	1.31	19.24	1.57	**123**	9.13	28.63	1.70
34	-4.17	11.28	0.37	**79**	1.78	18.93	1.59	**124**	10.25	28.33	0.93
35	-4.63	11.45	0.17	**80**	1.82	18.93	0.71	**125**	10.61	27.74	1.47
36	-4.38	13.34	0.07	**81**	1.59	18.65	1.41	**126**	10.59	27.60	1.96
37	-3.99	11.91	0.33	**82**	1.31	18.51	0.53	**127**	10.68	28.66	1.06
38	-4.34	11.33	0.45	**83**	1.71	18.60	0.56	**128**	11.18	28.93	1.33
39	-4.92	11.88	0.34	**84**	2.92	19.96	0.83	**129**	10.98	28.43	1.87
40	-4.01	11.35	0.37	**85**	2.67	19.74	0.64	**130**	10.90	28.93	3.30
41	-4.00	11.75	0.20	**86**	2.78	20.12	0.73	**131**	11.31	29.78	2.32
42	-4.17	12.20	0.26	**87**	2.77	18.88	0.90	**132**	11.46	29.75	1.75
43	-3.42	11.61	0.37	**88**	3.40	19.77	0.85	**133**	12.15	29.33	2.11
44	-3.75	11.86	0.36	**89**	2.91	20.74	0.84	**134**	11.58	29.29	2.36
45	-3.77	11.85	0.60	**90**	3.51	21.01	0.85	**135**	12.44	29.49	1.51

Hooker Scenario A2											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
136	12.35	28.94	2.25	**181**	20.06	36.92	2.56	**226**	21.13	36.04	2.66
137	12.76	28.93	1.76	**182**	20.47	37.22	2.37	**227**	21.07	36.24	2.21
138	13.08	29.79	1.95	**183**	20.96	37.49	1.46	**228**	20.98	36.54	2.88
139	12.87	30.53	2.41	**184**	21.52	37.36	1.61	**229**	20.78	36.66	0.69
140	12.80	30.93	1.27	**185**	22.05	37.86	2.39	**230**	20.78	37.18	0.81
141	13.60	30.42	0.50	**186**	22.01	38.34	1.24	**231**	20.64	36.85	0.74
142	13.81	30.90	0.56	**187**	22.11	38.52	1.50	**232**	20.75	36.97	1.38
143	14.29	30.73	2.26	**188**	21.93	38.45	1.31	**233**	20.76	36.47	0.60
144	14.46	31.52	1.33	**189**	21.86	39.11	2.32	**234**	20.69	36.53	0.80
145	14.08	32.06	1.54	**190**	22.21	39.16	1.29	**235**	20.47	36.50	1.03
146	14.09	32.30	1.21	**191**	22.20	38.86	2.43	**236**	20.26	36.28	1.97
147	14.39	31.81	1.57	**192**	21.99	38.22	2.28	**237**	20.52	35.28	1.24
148	15.33	32.34	1.03	**193**	22.41	38.57	2.06	**238**	20.12	35.61	1.98
149	15.15	32.88	2.22	**194**	22.07	39.20	2.75	**239**	20.21	35.72	1.49
150	15.43	32.16	1.04	**195**	21.92	38.71	2.13	**240**	19.80	35.35	0.90
151	15.77	32.91	1.42	**196**	22.34	39.00	2.28	**241**	19.53	35.44	1.68
152	16.35	33.28	1.65	**197**	22.50	38.58	3.36	**242**	19.29	34.74	1.89
153	16.67	32.94	1.78	**198**	22.14	38.62	1.88	**243**	19.15	34.85	1.19
154	17.24	33.45	0.74	**199**	22.21	39.24	1.08	**244**	18.72	35.38	0.70
155	17.92	34.08	0.91	**200**	22.52	39.48	1.35	**245**	18.11	34.59	0.44
156	17.81	33.69	1.33	**201**	22.31	38.72	1.91	**246**	17.52	33.92	0.82
157	17.17	33.43	0.94	**202**	22.15	39.00	1.19	**247**	17.43	33.65	1.00
158	17.99	33.97	2.35	**203**	22.22	38.71	1.29	**248**	17.20	33.67	0.70
159	17.91	34.88	0.97	**204**	21.96	38.65	1.11	**249**	17.26	32.76	0.99
160	18.76	35.49	0.87	**205**	21.95	38.80	1.20	**250**	17.06	33.40	0.55
161	18.66	35.83	1.86	**206**	22.17	39.11	1.75	**251**	16.82	33.13	1.05
162	18.46	34.97	1.46	**207**	21.92	38.75	2.23	**252**	16.38	32.61	1.15
163	19.02	35.46	1.60	**208**	22.13	37.82	3.07	**253**	16.75	32.46	1.00
164	19.39	35.63	1.46	**209**	21.83	38.35	1.28	**254**	16.19	31.90	0.56
165	19.20	34.78	2.58	**210**	21.74	39.02	1.66	**255**	16.69	32.17	0.84
166	19.15	35.61	1.91	**211**	21.54	38.61	1.52	**256**	15.85	33.07	0.44
167	18.43	35.58	2.47	**212**	21.64	37.52	2.88	**257**	16.54	32.49	0.37
168	18.68	36.11	1.01	**213**	21.40	37.83	1.44	**258**	16.61	31.91	0.71
169	18.61	35.91	1.77	**214**	21.05	37.41	1.16	**259**	15.68	31.95	1.10
170	19.00	35.49	2.21	**215**	21.20	38.23	0.96	**260**	15.77	32.31	1.07
171	19.11	36.18	2.34	**216**	21.25	37.67	2.39	**261**	16.26	31.98	0.40
172	19.06	35.92	1.29	**217**	21.43	37.71	2.04	**262**	16.04	32.15	0.64
173	19.01	35.78	1.45	**218**	21.22	37.50	2.81	**263**	15.24	31.91	1.79
174	19.15	36.51	0.76	**219**	21.09	36.93	2.14	**264**	15.88	32.74	0.34
175	19.64	36.28	0.49	**220**	20.98	37.19	2.67	**265**	15.74	31.95	0.98
176	19.55	36.10	1.13	**221**	20.91	36.83	2.54	**266**	15.55	31.30	0.88
177	19.59	36.52	1.84	**222**	20.92	37.23	1.60	**267**	15.88	30.96	0.70
178	19.66	37.30	1.85	**223**	21.00	37.09	0.58	**268**	14.85	29.78	0.65
179	19.94	37.09	1.78	**224**	21.07	37.27	2.36	**269**	14.46	29.86	0.50
180	20.17	36.67	2.23	**225**	20.94	36.95	1.05	**270**	13.69	30.41	0.68

Hooker Scenario A2											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
271	13.50	29.55	1.19	**316**	2.14	18.27	0.51	**361**	-4.63	11.13	0.61
272	13.40	29.38	0.85	**317**	1.07	18.10	0.42	**362**	-4.38	11.73	0.29
273	13.22	28.96	0.23	**318**	1.16	18.16	0.41	**363**	-4.90	10.65	0.31
274	11.83	28.07	0.57	**319**	1.00	18.30	0.51	**364**	-4.92	10.13	0.36
275	11.39	27.53	2.08	**320**	0.85	17.66	0.63	**365**	-5.07	10.88	0.30
276	10.33	28.08	1.54	**321**	0.12	17.52	0.78				
277	11.30	27.94	1.36	**322**	0.16	17.08	0.42				
278	11.10	27.61	2.15	**323**	-0.14	17.20	0.16				
279	10.71	27.41	1.80	**324**	-0.09	16.81	0.76				
280	10.43	26.72	1.37	**325**	-0.54	16.91	0.30				
281	9.89	26.31	0.98	**326**	-0.56	15.61	0.34				
282	9.70	26.91	1.04	**327**	-0.03	14.62	0.51				
283	9.36	25.67	0.86	**328**	-0.63	16.64	0.18				
284	9.69	25.69	0.72	**329**	-0.87	15.92	0.85				
285	8.32	25.76	0.66	**330**	-0.57	15.85	0.15				
286	7.83	25.65	0.77	**331**	-1.07	15.23	0.52				
287	7.87	25.01	0.42	**332**	-2.03	14.36	0.23				
288	8.18	24.86	1.00	**333**	-1.85	15.09	0.32				
289	7.69	23.82	2.30	**334**	-1.52	13.90	0.94				
290	7.21	24.04	2.35	**335**	-2.13	14.41	1.09				
291	7.90	23.97	1.99	**336**	-3.35	13.88	0.34				
292	7.19	23.76	1.40	**337**	-3.51	11.89	0.46				
293	6.70	23.10	1.46	**338**	-4.56	11.94	1.12				
294	6.69	24.31	1.11	**339**	-3.97	11.37	0.51				
295	6.79	23.65	0.61	**340**	-4.25	10.95	0.67				
296	6.54	23.18	1.18	**341**	-4.58	10.45	1.32				
297	6.70	23.53	1.64	**342**	-4.69	10.93	0.16				
298	5.50	21.59	1.34	**343**	-4.72	11.36	0.51				
299	5.41	22.42	1.11	**344**	-5.01	11.28	0.69				
300	5.49	22.64	0.63	**345**	-5.34	10.60	1.17				
301	4.91	21.94	0.59	**346**	-5.17	9.87	1.16				
302	5.45	21.64	0.99	**347**	-5.18	10.23	0.31				
303	4.64	20.79	1.44	**348**	-4.22	11.06	1.20				
304	4.46	20.42	1.40	**349**	-4.02	11.68	1.10				
305	4.44	20.58	0.29	**350**	-4.33	10.97	0.14				
306	4.98	21.43	0.87	**351**	-4.18	11.14	0.35				
307	4.32	19.49	0.89	**352**	-5.04	11.09	0.47				
308	4.09	19.41	1.05	**353**	-5.63	10.23	0.71				
309	3.51	19.86	0.62	**354**	-5.05	9.80	0.46				
310	3.22	20.12	0.36	**355**	-4.47	10.65	0.66				
311	2.77	20.01	0.05	**356**	-3.80	10.26	0.24				
312	2.64	19.04	0.52	**357**	-3.97	10.60	0.43				
313	2.46	18.55	1.48	**358**	-5.43	10.10	1.37				
314	1.40	18.86	0.48	**359**	-5.41	11.75	0.17				
315	1.94	17.58	0.32	**360**	-5.00	10.25	0.46				

Hooker Scenario B1											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
1	-5.83	11.65	0.46	**46**	-3.79	12.41	0.37	**91**	2.08	19.76	1.42
2	-5.68	9.62	0.53	**47**	-4.22	12.09	0.46	**92**	3.31	19.77	1.24
3	-5.06	10.95	0.19	**48**	-4.14	10.92	0.50	**93**	3.24	22.36	0.39
4	-5.11	11.14	0.09	**49**	-4.63	12.40	0.57	**94**	3.88	21.73	0.60
5	-5.84	10.80	0.15	**50**	-3.68	14.05	0.32	**95**	3.67	20.75	0.87
6	-5.88	10.34	0.29	**51**	-3.91	13.04	0.36	**96**	3.25	20.60	0.61
7	-5.70	10.36	0.51	**52**	-4.14	11.66	0.49	**97**	4.40	21.94	1.05
8	-4.83	10.37	0.25	**53**	-3.87	12.27	0.74	**98**	4.10	21.69	1.67
9	-5.07	11.88	0.24	**54**	-3.35	12.54	0.49	**99**	3.83	21.92	1.56
10	-4.71	12.40	0.25	**55**	-3.56	14.17	0.07	**100**	4.73	22.54	0.77
11	-5.31	12.55	0.32	**56**	-3.55	12.49	0.61	**101**	4.29	22.53	1.28
12	-5.26	11.52	0.49	**57**	-3.22	12.92	0.50	**102**	4.78	21.94	1.30
13	-4.89	12.43	0.14	**58**	-3.25	13.12	0.38	**103**	4.97	23.34	2.09
14	-5.30	11.01	0.25	**59**	-3.19	13.74	0.75	**104**	4.92	22.57	0.88
15	-5.83	10.86	0.16	**60**	-0.93	16.33	1.33	**105**	5.58	23.17	1.06
16	-5.72	12.04	0.78	**61**	-1.65	15.78	0.95	**106**	5.52	22.40	1.28
17	-5.40	11.47	0.31	**62**	-1.88	15.09	0.83	**107**	5.58	22.60	1.24
18	-5.43	12.27	0.33	**63**	-1.71	15.43	0.56	**108**	5.98	22.33	1.20
19	-4.88	11.68	0.18	**64**	-1.34	16.33	1.23	**109**	6.39	23.98	0.91
20	-5.00	10.07	0.51	**65**	-1.10	15.22	0.85	**110**	6.53	22.11	1.26
21	-5.00	11.21	0.36	**66**	-0.71	15.72	0.54	**111**	7.31	23.93	1.95
22	-4.91	11.95	0.14	**67**	-0.66	15.81	1.17	**112**	6.35	24.73	1.27
23	-4.64	11.24	0.45	**68**	-1.34	16.72	0.33	**113**	6.34	24.05	2.01
24	-5.21	11.23	0.67	**69**	-0.74	16.98	0.27	**114**	7.12	24.26	0.73
25	-5.21	11.17	0.92	**70**	-0.77	16.52	1.07	**115**	7.75	24.71	1.68
26	-4.49	12.68	0.29	**71**	0.13	16.67	1.27	**116**	8.12	24.96	0.81
27	-5.19	12.01	0.15	**72**	0.32	16.05	2.82	**117**	7.72	24.46	0.90
28	-4.97	10.72	0.38	**73**	0.24	16.12	0.95	**118**	8.51	24.81	1.02
29	-4.62	12.98	0.17	**74**	-0.17	16.81	1.61	**119**	8.41	24.68	1.94
30	-5.03	12.74	0.62	**75**	0.55	17.27	1.14	**120**	8.04	25.64	1.94
31	-5.11	13.01	0.09	**76**	1.12	17.64	1.39	**121**	8.42	27.31	0.35
32	-5.25	12.58	0.54	**77**	0.52	18.13	0.48	**122**	9.12	27.70	1.55
33	-4.60	13.11	0.13	**78**	0.83	18.76	1.67	**123**	8.37	27.73	1.58
34	-4.38	11.08	0.36	**79**	1.29	18.45	1.68	**124**	9.31	27.57	0.87
35	-4.84	11.25	0.16	**80**	1.32	18.43	0.75	**125**	9.78	26.86	1.41
36	-4.60	13.14	0.07	**81**	1.08	18.14	1.50	**126**	9.79	26.68	1.92
37	-4.22	11.70	0.32	**82**	0.80	18.00	0.56	**127**	9.87	27.68	1.15
38	-4.57	11.12	0.44	**83**	1.19	18.09	0.59	**128**	10.50	28.02	1.38
39	-5.15	11.67	0.34	**84**	2.39	19.43	0.88	**129**	10.21	27.63	1.87
40	-4.23	11.14	0.37	**85**	2.13	19.21	0.68	**130**	10.07	28.07	3.31
41	-4.22	11.54	0.19	**86**	2.23	19.58	0.77	**131**	10.42	28.92	2.40
42	-4.39	12.00	0.26	**87**	2.22	18.34	0.95	**132**	10.61	28.85	1.80
43	-3.63	11.40	0.37	**88**	2.82	19.22	0.90	**133**	11.38	28.38	2.13
44	-3.97	11.65	0.35	**89**	2.34	20.17	0.88	**134**	10.67	28.45	2.42
45	-3.98	11.64	0.59	**90**	2.93	20.44	0.89	**135**	11.55	28.69	1.61

Hooker Scenario B1											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
136	11.45	28.06	2.42	**181**	19.36	36.23	2.98	**226**	20.72	35.63	2.53
137	11.94	28.00	1.89	**182**	19.80	36.53	2.53	**227**	20.66	35.83	2.10
138	12.24	28.93	2.08	**183**	20.31	36.83	1.55	**228**	20.58	36.12	2.72
139	12.00	29.70	2.65	**184**	20.88	36.72	1.71	**229**	20.37	36.25	0.65
140	11.95	30.08	1.35	**185**	21.43	37.25	2.54	**230**	20.37	36.76	0.76
141	12.71	29.55	0.54	**186**	21.41	37.74	1.32	**231**	20.23	36.44	0.71
142	12.91	30.08	0.59	**187**	21.51	37.92	1.59	**232**	20.35	36.56	1.30
143	13.41	29.87	2.41	**188**	21.33	37.86	1.39	**233**	20.35	36.07	0.56
144	13.71	30.57	1.46	**189**	21.27	38.52	2.47	**234**	20.28	36.12	0.75
145	13.31	31.26	1.66	**190**	21.62	38.57	1.37	**235**	20.07	36.10	0.96
146	13.27	31.39	1.30	**191**	21.62	38.27	2.59	**236**	19.87	35.88	1.84
147	13.59	30.86	1.69	**192**	21.42	37.64	2.43	**237**	20.13	34.90	1.16
148	14.52	31.44	1.07	**193**	21.84	37.98	2.19	**238**	19.75	35.23	1.84
149	14.35	32.15	2.20	**194**	21.49	38.61	2.93	**239**	19.82	35.35	1.39
150	14.59	31.46	1.06	**195**	21.34	38.12	2.27	**240**	19.44	34.99	0.83
151	14.95	32.06	1.47	**196**	21.75	38.42	2.42	**241**	19.18	35.08	1.56
152	15.44	32.49	1.86	**197**	21.92	38.00	3.58	**242**	18.93	34.39	1.76
153	15.72	32.18	2.05	**198**	21.56	38.03	2.01	**243**	18.81	34.52	1.10
154	16.33	32.54	0.84	**199**	21.63	38.66	1.15	**244**	18.39	35.05	0.63
155	17.10	33.22	0.93	**200**	21.93	38.90	1.44	**245**	17.78	34.27	0.39
156	16.98	32.76	1.53	**201**	21.73	38.14	2.03	**246**	17.20	33.59	0.74
157	16.37	32.47	1.12	**202**	21.57	38.42	1.27	**247**	17.12	33.34	0.90
158	17.04	33.13	2.70	**203**	21.63	38.13	1.37	**248**	16.89	33.36	0.63
159	17.10	33.95	1.06	**204**	21.38	38.08	1.18	**249**	16.96	32.44	0.89
160	17.95	34.51	0.96	**205**	21.38	38.22	1.27	**250**	16.77	33.10	0.49
161	17.88	34.85	2.14	**206**	21.61	38.54	1.86	**251**	16.54	32.84	0.94
162	17.64	34.06	1.65	**207**	21.35	38.18	2.37	**252**	16.11	32.33	1.03
163	18.20	34.58	1.78	**208**	21.56	37.25	3.27	**253**	16.49	32.18	0.90
164	18.50	34.84	1.63	**209**	21.28	37.80	1.37	**254**	15.92	31.63	0.51
165	18.28	33.99	2.88	**210**	21.21	38.48	1.76	**255**	16.43	31.91	0.75
166	18.34	34.80	2.13	**211**	21.02	38.09	1.62	**256**	15.60	32.80	0.39
167	17.62	34.78	2.74	**212**	21.13	37.02	3.07	**257**	16.30	32.24	0.33
168	17.88	35.31	1.12	**213**	20.91	37.34	1.46	**258**	16.35	31.67	0.64
169	17.82	35.12	1.98	**214**	20.58	36.93	1.16	**259**	15.44	31.70	0.98
170	18.22	34.71	2.47	**215**	20.73	37.76	0.96	**260**	15.53	32.07	0.96
171	18.33	35.41	2.61	**216**	20.79	37.21	2.38	**261**	16.02	31.75	0.36
172	18.30	35.17	1.45	**217**	20.98	37.26	2.02	**262**	15.81	31.92	0.57
173	18.25	35.03	1.66	**218**	20.77	37.04	2.76	**263**	15.02	31.70	1.60
174	18.39	35.77	0.85	**219**	20.66	36.48	2.09	**264**	15.66	32.53	0.30
175	18.89	35.55	0.56	**220**	20.56	36.75	2.60	**265**	15.53	31.74	0.88
176	18.82	35.38	1.26	**221**	20.49	36.41	2.48	**266**	15.35	31.10	0.79
177	18.86	35.81	2.11	**222**	20.49	36.80	1.55	**267**	15.68	30.78	0.62
178	18.94	36.60	2.12	**223**	20.58	36.67	0.56	**268**	14.66	29.60	0.59
179	19.23	36.39	2.00	**224**	20.66	36.85	2.27	**269**	14.27	29.68	0.44
180	19.47	35.97	2.56	**225**	20.52	36.53	1.01	**270**	13.50	30.24	0.61

Hooker Scenario B1											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
271	13.32	29.38	1.06	**316**	1.89	18.02	0.54	**361**	-4.91	10.85	0.63
272	13.21	29.20	0.76	**317**	0.81	17.84	0.45	**362**	-4.66	11.45	0.30
273	13.03	28.78	0.21	**318**	0.91	17.90	0.44	**363**	-5.17	10.39	0.32
274	11.64	27.88	0.57	**319**	0.72	18.03	0.55	**364**	-5.16	9.87	0.37
275	11.21	27.34	2.05	**320**	0.58	17.38	0.69	**365**	-5.31	10.64	0.30
276	10.15	27.89	1.52	**321**	-0.15	17.24	0.85				
277	11.11	27.76	1.34	**322**	-0.13	16.80	0.45				
278	10.92	27.43	2.12	**323**	-0.41	16.92	0.18				
279	10.53	27.24	1.78	**324**	-0.37	16.54	0.82				
280	10.26	26.55	1.36	**325**	-0.82	16.64	0.32				
281	9.73	26.15	0.96	**326**	-0.84	15.34	0.36				
282	9.54	26.75	1.03	**327**	-0.32	14.33	0.55				
283	9.20	25.51	0.85	**328**	-0.91	16.36	0.20				
284	9.53	25.54	0.71	**329**	-1.16	15.65	0.93				
285	8.17	25.60	0.66	**330**	-0.85	15.57	0.17				
286	7.69	25.51	0.76	**331**	-1.35	14.95	0.55				
287	7.72	24.88	0.41	**332**	-2.32	14.07	0.25				
288	8.04	24.71	0.99	**333**	-2.14	14.82	0.34				
289	7.55	23.67	2.27	**334**	-1.81	13.61	1.01				
290	7.07	23.90	2.32	**335**	-2.42	14.12	1.16				
291	7.75	23.83	1.96	**336**	-3.64	13.59	0.36				
292	7.04	23.61	1.38	**337**	-3.80	11.60	0.49				
293	6.54	22.94	1.43	**338**	-4.86	11.64	1.19				
294	6.53	24.14	1.09	**339**	-4.27	11.07	0.55				
295	6.63	23.49	0.60	**340**	-4.55	10.65	0.71				
296	6.37	23.00	1.16	**341**	-4.88	10.15	1.40				
297	6.53	23.36	1.62	**342**	-4.99	10.62	0.17				
298	5.33	21.42	1.32	**343**	-5.03	11.06	0.54				
299	5.23	22.23	1.10	**344**	-5.31	10.98	0.73				
300	5.30	22.45	0.62	**345**	-5.64	10.30	1.23				
301	4.72	21.75	0.59	**346**	-5.48	9.56	1.23				
302	5.26	21.45	0.98	**347**	-5.48	9.93	0.33				
303	4.44	20.59	1.43	**348**	-4.52	10.76	1.26				
304	4.25	20.22	1.38	**349**	-4.32	11.37	1.16				
305	4.23	20.37	0.30	**350**	-4.63	10.67	0.15				
306	4.77	21.20	0.90	**351**	-4.49	10.84	0.37				
307	4.11	19.27	0.92	**352**	-5.34	10.79	0.49				
308	3.87	19.17	1.09	**353**	-5.93	9.92	0.75				
309	3.29	19.62	0.64	**354**	-5.35	9.50	0.48				
310	2.99	19.88	0.38	**355**	-4.77	10.35	0.69				
311	2.54	19.76	0.06	**356**	-4.10	9.96	0.25				
312	2.40	18.79	0.54	**357**	-4.27	10.30	0.45				
313	2.21	18.30	1.56	**358**	-5.73	9.80	1.43				
314	1.15	18.61	0.51	**359**	-5.70	11.45	0.17				
315	1.69	17.32	0.35	**360**	-5.29	9.96	0.47				

Beaver Scenario A1B											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
1	-4.15	12.68	0.59	**46**	-3.32	13.77	0.57	**91**	4.29	22.34	0.86
2	-4.13	11.69	0.61	**47**	-2.31	13.34	0.33	**92**	5.74	22.81	1.38
3	-4.15	11.62	0.60	**48**	-2.93	13.89	0.41	**93**	5.41	21.10	2.01
4	-4.64	11.54	0.53	**49**	-2.52	12.96	0.34	**94**	4.85	22.35	1.53
5	-4.91	11.50	0.30	**50**	-2.67	12.58	0.70	**95**	5.35	22.46	1.07
6	-4.45	11.70	0.52	**51**	-2.72	13.07	0.66	**96**	6.28	22.99	0.69
7	-4.71	11.81	0.32	**52**	-3.46	12.07	0.97	**97**	5.98	21.55	1.61
8	-5.01	11.45	0.41	**53**	-3.08	13.19	0.55	**98**	6.38	22.41	1.06
9	-4.92	13.07	0.72	**54**	-3.21	15.08	0.71	**99**	6.32	23.43	0.59
10	-4.68	12.63	0.81	**55**	-2.25	14.22	0.43	**100**	5.65	23.42	1.21
11	-4.05	10.90	0.50	**56**	-1.63	13.03	0.80	**101**	6.14	23.28	1.83
12	-4.34	11.52	0.35	**57**	-1.97	12.97	0.46	**102**	6.36	22.94	0.76
13	-4.90	11.34	0.22	**58**	-1.28	12.29	0.69	**103**	6.80	23.55	0.80
14	-4.58	11.23	0.53	**59**	-1.67	14.38	0.66	**104**	6.32	24.04	1.74
15	-4.88	11.72	0.42	**60**	-0.59	16.17	0.34	**105**	7.51	24.46	1.67
16	-4.58	12.98	0.24	**61**	-0.54	16.78	0.31	**106**	7.32	24.95	0.83
17	-4.13	11.89	0.19	**62**	-0.05	18.14	0.33	**107**	6.80	25.22	1.22
18	-3.78	12.35	0.14	**63**	0.13	17.76	0.84	**108**	7.68	23.78	1.02
19	-4.27	12.69	0.71	**64**	0.09	16.63	0.70	**109**	6.63	23.49	1.09
20	-4.51	12.35	0.26	**65**	0.74	16.50	0.30	**110**	6.67	24.12	1.08
21	-4.21	12.82	0.39	**66**	0.48	16.82	0.34	**111**	8.20	24.24	1.66
22	-3.84	12.29	0.25	**67**	0.73	16.80	0.99	**112**	7.61	23.53	1.45
23	-4.22	12.58	0.40	**68**	0.86	18.15	0.94	**113**	7.74	25.31	2.35
24	-3.56	13.05	0.52	**69**	0.55	16.96	1.58	**114**	8.35	25.56	1.17
25	-3.79	13.47	0.16	**70**	1.43	17.91	0.43	**115**	8.26	25.73	1.05
26	-4.45	13.01	0.43	**71**	2.10	18.27	0.80	**116**	9.56	26.99	1.21
27	-4.25	13.01	0.33	**72**	1.93	18.96	0.84	**117**	9.23	25.68	1.22
28	-4.10	13.53	0.28	**73**	2.20	19.19	1.13	**118**	8.76	25.61	1.87
29	-3.75	13.36	0.55	**74**	1.42	20.50	1.13	**119**	10.02	27.87	1.56
30	-4.14	12.70	0.15	**75**	1.66	18.67	1.45	**120**	10.32	27.52	0.88
31	-3.49	13.20	0.67	**76**	2.50	17.98	1.34	**121**	10.16	27.09	1.16
32	-3.71	13.82	0.13	**77**	2.47	18.02	1.84	**122**	10.45	27.48	1.14
33	-4.18	13.96	0.15	**78**	3.36	19.50	1.59	**123**	10.18	28.76	1.12
34	-3.78	11.98	0.30	**79**	3.32	18.84	2.11	**124**	11.41	28.85	0.98
35	-4.08	13.36	0.21	**80**	3.08	20.95	0.68	**125**	12.10	28.90	1.42
36	-3.41	12.69	0.33	**81**	3.11	20.12	1.18	**126**	11.51	28.84	0.84
37	-3.21	12.73	0.19	**82**	3.00	20.79	1.22	**127**	11.65	29.52	0.38
38	-2.52	12.14	0.56	**83**	3.28	21.26	0.43	**128**	10.96	28.79	0.87
39	-3.26	13.49	0.44	**84**	3.59	21.14	0.66	**129**	11.83	29.06	1.82
40	-3.51	12.79	0.23	**85**	3.24	20.86	1.13	**130**	12.71	29.86	1.29
41	-3.94	12.45	0.35	**86**	3.58	20.71	1.46	**131**	12.97	29.18	1.21
42	-3.22	13.75	0.47	**87**	4.66	20.55	0.92	**132**	12.89	29.36	1.39
43	-3.40	13.59	0.23	**88**	4.05	20.41	1.76	**133**	12.67	30.94	1.45
44	-3.11	14.03	0.63	**89**	4.98	20.79	1.48	**134**	13.04	30.17	1.35
45	-3.60	13.89	0.19	**90**	4.94	21.91	0.71	**135**	13.17	29.91	1.01

Beaver Scenario A1B											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
136	13.36	30.86	2.09	**181**	21.41	36.69	2.90	**226**	21.56	37.23	1.18
137	13.93	30.33	1.06	**182**	21.04	36.76	1.00	**227**	22.01	36.96	1.89
138	14.52	30.63	1.68	**183**	21.95	37.57	2.25	**228**	21.71	37.10	2.50
139	13.76	30.25	1.62	**184**	22.07	38.19	1.09	**229**	21.62	36.23	1.58
140	14.22	31.21	1.41	**185**	22.30	38.00	1.37	**230**	21.40	36.37	2.93
141	14.50	30.96	1.75	**186**	23.15	38.40	1.31	**231**	21.60	37.44	2.91
142	14.17	31.43	2.57	**187**	23.13	38.44	1.06	**232**	21.36	36.55	3.46
143	14.90	31.18	1.63	**188**	22.85	38.69	1.51	**233**	21.21	36.34	2.16
144	14.68	30.25	1.73	**189**	23.36	37.71	1.75	**234**	21.52	35.49	3.53
145	15.02	31.16	2.89	**190**	23.29	37.93	2.67	**235**	21.26	35.83	2.36
146	15.15	31.16	1.65	**191**	23.41	39.00	0.87	**236**	21.13	36.09	3.01
147	15.97	32.01	0.72	**192**	23.20	39.16	0.90	**237**	21.24	36.66	3.09
148	15.84	31.77	1.09	**193**	22.93	38.78	1.98	**238**	20.94	36.51	0.92
149	16.23	31.71	1.73	**194**	22.74	38.42	1.97	**239**	20.44	35.70	1.94
150	16.07	32.25	1.54	**195**	23.26	38.52	2.15	**240**	20.29	35.57	1.14
151	16.91	32.52	1.84	**196**	23.05	38.53	1.27	**241**	20.32	35.87	1.87
152	16.87	32.76	1.29	**197**	23.58	38.97	1.32	**242**	19.82	34.78	2.69
153	17.03	32.76	3.12	**198**	23.25	39.31	0.74	**243**	19.46	34.89	3.03
154	17.89	32.74	1.43	**199**	23.52	38.83	1.15	**244**	18.58	34.50	1.07
155	18.46	33.01	3.25	**200**	23.35	38.43	1.14	**245**	18.36	33.90	1.14
156	17.93	33.60	2.71	**201**	23.29	38.29	1.46	**246**	18.40	33.37	2.02
157	18.19	33.68	1.53	**202**	23.66	38.76	0.69	**247**	17.84	33.86	0.96
158	18.87	32.98	3.99	**203**	23.29	39.07	1.73	**248**	17.51	33.56	3.10
159	19.54	32.92	1.55	**204**	23.48	38.73	1.60	**249**	17.56	33.46	0.93
160	19.81	34.16	2.12	**205**	23.45	38.34	1.56	**250**	16.88	33.26	1.31
161	19.67	34.27	2.02	**206**	23.34	38.67	2.25	**251**	16.66	33.45	0.72
162	19.47	34.28	2.47	**207**	22.79	38.54	2.09	**252**	16.88	32.90	0.25
163	19.04	33.89	2.65	**208**	23.57	38.71	1.37	**253**	16.30	32.98	1.63
164	19.64	34.46	2.84	**209**	22.84	38.92	1.08	**254**	16.57	32.33	1.35
165	19.85	34.20	3.87	**210**	22.39	38.72	1.08	**255**	16.82	32.47	0.93
166	19.92	35.44	1.93	**211**	22.61	38.54	1.20	**256**	17.17	32.89	0.82
167	19.74	35.48	1.91	**212**	22.70	38.54	0.70	**257**	17.29	31.87	3.25
168	20.37	34.58	2.13	**213**	22.22	38.04	3.15	**258**	16.67	31.88	1.92
169	20.61	36.15	2.33	**214**	22.34	37.75	1.64	**259**	16.73	32.27	1.58
170	20.35	35.79	2.91	**215**	22.20	37.49	1.30	**260**	16.78	32.04	1.20
171	20.62	35.39	2.47	**216**	22.02	36.99	3.67	**261**	16.91	31.20	0.81
172	19.97	35.82	1.87	**217**	22.00	36.76	1.22	**262**	16.37	30.76	1.71
173	20.46	35.52	2.32	**218**	21.77	36.75	1.83	**263**	15.98	31.10	1.85
174	20.43	35.92	3.52	**219**	21.63	36.79	0.97	**264**	15.27	30.63	0.52
175	20.19	35.90	4.11	**220**	21.99	36.91	1.29	**265**	15.98	30.58	1.34
176	21.15	36.15	3.13	**221**	21.89	36.62	2.09	**266**	15.96	30.00	0.96
177	21.30	35.94	3.79	**222**	21.29	36.19	1.95	**267**	15.81	30.39	1.03
178	21.04	36.05	3.13	**223**	21.23	37.09	1.99	**268**	14.92	29.58	0.85
179	21.14	36.11	1.34	**224**	21.42	37.24	1.87	**269**	15.10	30.07	1.56
180	20.83	37.07	1.68	**225**	21.58	37.01	1.26	**270**	14.77	29.22	2.42

Beaver Scenario A1B											
day	min T[℃]	max T[℃]	rain(mm)	day	min T[℃]	max T[℃]	rain(mm)	day	min T[℃]	max T[℃]	rain(mm)
271	13.81	28.99	1.33	**316**	2.00	19.51	0.50	**361**	-4.23	12.13	0.76
272	13.54	29.96	0.87	**317**	2.46	19.14	1.49	**362**	-4.36	12.71	0.28
273	13.11	28.91	1.17	**318**	1.43	19.86	0.82	**363**	-3.58	12.40	0.86
274	12.42	27.70	1.45	**319**	1.47	18.85	0.91	**364**	-4.71	12.37	0.94
275	12.10	27.90	1.64	**320**	1.73	18.36	0.52	**365**	-3.85	12.59	0.78
276	12.10	27.17	1.27	**321**	0.83	17.54	0.70				
277	11.64	26.43	2.44	**322**	0.22	18.12	0.79				
278	11.15	27.14	0.20	**323**	0.51	17.80	1.19				
279	10.84	26.24	0.92	**324**	0.92	18.20	1.18				
280	9.78	26.94	0.14	**325**	-0.24	16.99	0.56				
281	9.52	26.13	1.97	**326**	0.00	16.64	0.98				
282	10.27	25.75	1.34	**327**	0.34	17.00	0.48				
283	10.97	25.27	1.75	**328**	0.80	16.57	0.47				
284	9.96	26.11	1.24	**329**	0.43	15.43	0.34				
285	8.85	25.62	2.30	**330**	-0.69	15.01	0.64				
286	8.99	24.42	2.51	**331**	-0.96	16.10	0.64				
287	8.92	25.79	0.88	**332**	-1.26	16.08	1.31				
288	7.68	25.33	0.50	**333**	-1.16	15.07	0.86				
289	7.96	25.00	0.06	**334**	-0.74	14.36	1.45				
290	8.11	24.24	1.12	**335**	-2.14	14.86	1.24				
291	8.01	25.07	1.72	**336**	-2.16	14.29	0.65				
292	7.63	24.20	2.54	**337**	-2.04	12.95	0.51				
293	6.99	23.57	0.84	**338**	-3.52	12.23	0.83				
294	6.82	23.72	2.40	**339**	-3.34	12.31	0.98				
295	6.21	23.45	1.08	**340**	-4.26	12.14	0.62				
296	6.88	23.21	0.95	**341**	-3.67	12.34	0.55				
297	6.57	23.89	0.60	**342**	-3.39	11.92	0.85				
298	6.80	22.70	0.43	**343**	-3.50	10.97	0.50				
299	6.34	22.36	0.14	**344**	-4.58	10.20	0.22				
300	5.77	21.45	0.80	**345**	-4.83	11.89	0.46				
301	5.69	22.37	1.70	**346**	-4.79	11.22	0.39				
302	5.35	20.95	0.55	**347**	-4.86	11.67	0.40				
303	4.80	21.88	1.04	**348**	-3.97	11.17	1.60				
304	4.93	22.44	0.73	**349**	-4.29	10.99	0.39				
305	4.79	21.90	0.66	**350**	-4.19	11.13	0.64				
306	4.44	22.08	1.08	**351**	-4.24	11.94	0.67				
307	4.85	21.33	0.89	**352**	-3.83	10.43	0.23				
308	3.47	21.52	0.90	**353**	-3.88	10.92	0.62				
309	3.71	20.71	1.06	**354**	-4.60	10.59	0.82				
310	2.87	20.52	0.73	**355**	-3.81	11.55	0.93				
311	3.94	19.34	0.64	**356**	-3.74	12.36	0.52				
312	3.63	18.76	1.43	**357**	-3.92	12.29	0.95				
313	2.81	19.44	1.54	**358**	-4.30	11.60	0.46				
314	2.29	18.87	1.02	**359**	-4.32	11.30	0.23				
315	1.74	18.91	1.23	**360**	-4.36	11.03	0.60				

Beaver Scenario A2											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
1	-4.60	12.25	0.65	**46**	-4.01	13.07	0.59	**91**	4.00	22.05	0.86
2	-4.58	11.25	0.67	**47**	-3.01	12.64	0.34	**92**	5.46	22.52	1.38
3	-4.62	11.16	0.67	**48**	-3.63	13.20	0.42	**93**	5.14	20.80	2.01
4	-5.12	11.09	0.59	**49**	-3.23	12.26	0.35	**94**	4.59	22.09	1.53
5	-5.39	11.04	0.34	**50**	-3.37	11.88	0.72	**95**	5.11	22.20	1.07
6	-4.94	11.23	0.58	**51**	-3.44	12.37	0.68	**96**	6.05	22.75	0.69
7	-5.20	11.34	0.35	**52**	-4.20	11.37	0.99	**97**	5.75	21.31	1.62
8	-5.51	10.97	0.45	**53**	-3.83	12.49	0.57	**98**	6.18	22.20	1.06
9	-5.43	12.58	0.80	**54**	-3.96	14.38	0.72	**99**	6.13	23.24	0.59
10	-5.18	12.14	0.89	**55**	-3.02	13.52	0.44	**100**	5.47	23.24	1.21
11	-4.56	10.41	0.55	**56**	-2.40	12.33	0.81	**101**	5.98	23.12	1.84
12	-4.85	11.02	0.39	**57**	-2.77	12.26	0.47	**102**	6.22	22.80	0.76
13	-5.41	10.84	0.24	**58**	-2.07	11.59	0.69	**103**	6.67	23.43	0.80
14	-5.10	10.72	0.59	**59**	-2.44	13.69	0.67	**104**	6.21	23.94	1.74
15	-5.39	11.20	0.47	**60**	-1.20	15.58	0.34	**105**	7.41	24.37	1.67
16	-5.09	12.46	0.27	**61**	-1.14	16.18	0.31	**106**	7.25	24.88	0.83
17	-4.64	11.37	0.22	**62**	-0.64	17.56	0.33	**107**	6.74	25.15	1.22
18	-4.29	11.82	0.15	**63**	-0.46	17.19	0.84	**108**	7.62	23.73	1.02
19	-4.78	12.16	0.78	**64**	-0.47	16.07	0.71	**109**	6.59	23.45	1.09
20	-5.03	11.82	0.29	**65**	0.16	15.94	0.30	**110**	6.65	24.09	1.07
21	-4.72	12.28	0.43	**66**	-0.09	16.26	0.34	**111**	8.20	24.23	1.65
22	-4.36	11.75	0.28	**67**	0.16	16.25	0.99	**112**	7.63	23.55	1.44
23	-4.75	12.03	0.44	**68**	0.31	17.61	0.94	**113**	7.76	25.33	2.32
24	-4.09	12.50	0.57	**69**	0.01	16.43	1.59	**114**	8.37	25.59	1.16
25	-4.32	12.91	0.18	**70**	0.89	17.38	0.43	**115**	8.28	25.76	1.04
26	-5.00	12.44	0.48	**71**	1.56	17.76	0.80	**116**	9.59	27.03	1.19
27	-4.79	12.43	0.36	**72**	1.39	18.42	0.84	**117**	9.26	25.71	1.20
28	-4.65	12.95	0.31	**73**	1.67	18.67	1.13	**118**	8.78	25.64	1.83
29	-4.31	12.78	0.61	**74**	0.90	19.98	1.12	**119**	10.05	27.91	1.52
30	-4.72	12.11	0.17	**75**	1.15	18.16	1.45	**120**	10.36	27.56	0.86
31	-4.09	12.59	0.74	**76**	2.00	17.47	1.33	**121**	10.19	27.13	1.13
32	-4.32	13.22	0.14	**77**	1.98	17.52	1.84	**122**	10.51	27.54	1.11
33	-4.81	13.34	0.16	**78**	2.88	19.01	1.59	**123**	10.25	28.83	1.09
34	-4.40	11.34	0.32	**79**	2.86	18.36	2.10	**124**	11.50	28.94	0.95
35	-4.71	12.71	0.22	**80**	2.63	20.48	0.68	**125**	12.19	29.01	1.38
36	-4.05	12.03	0.35	**81**	2.69	19.65	1.18	**126**	11.61	28.94	0.81
37	-3.86	12.05	0.20	**82**	2.59	20.33	1.22	**127**	11.75	29.62	0.37
38	-3.18	11.46	0.59	**83**	2.88	20.83	0.42	**128**	11.08	28.89	0.84
39	-3.93	12.81	0.46	**84**	3.20	20.71	0.66	**129**	11.95	29.17	1.75
40	-4.19	12.10	0.25	**85**	2.87	20.43	1.13	**130**	12.84	29.98	1.24
41	-4.63	11.76	0.36	**86**	3.22	20.29	1.45	**131**	13.11	29.29	1.16
42	-3.90	13.06	0.49	**87**	4.31	20.17	0.92	**132**	13.04	29.48	1.33
43	-4.09	12.90	0.24	**88**	3.73	20.05	1.76	**133**	12.83	31.08	1.39
44	-3.80	13.33	0.65	**89**	4.67	20.45	1.48	**134**	13.20	30.29	1.28
45	-4.30	13.20	0.20	**90**	4.63	21.61	0.71	**135**	13.33	30.05	0.96

Beaver Scenario A2											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
136	13.50	31.00	1.99	**181**	21.53	36.80	2.62	**226**	21.65	37.33	1.21
137	14.07	30.48	1.00	**182**	21.15	36.86	0.98	**227**	22.10	37.05	1.93
138	14.65	30.76	1.59	**183**	22.04	37.66	2.21	**228**	21.81	37.20	2.56
139	13.88	30.39	1.53	**184**	22.15	38.27	1.07	**229**	21.71	36.33	1.62
140	14.35	31.36	1.32	**185**	22.36	38.06	1.34	**230**	21.49	36.45	3.01
141	14.62	31.11	1.64	**186**	23.21	38.45	1.28	**231**	21.68	37.53	2.98
142	14.28	31.57	2.41	**187**	23.18	38.49	1.04	**232**	21.43	36.63	3.54
143	15.02	31.32	1.52	**188**	22.89	38.73	1.48	**233**	21.28	36.41	2.21
144	14.81	30.39	1.61	**189**	23.40	37.77	1.72	**234**	21.59	35.56	3.62
145	15.15	31.31	2.69	**190**	23.33	37.98	2.62	**235**	21.33	35.90	2.42
146	15.28	31.31	1.54	**191**	23.45	39.04	0.85	**236**	21.20	36.16	3.08
147	16.13	32.16	0.67	**192**	23.24	39.19	0.88	**237**	21.32	36.73	3.17
148	15.99	31.93	1.02	**193**	22.97	38.81	1.94	**238**	21.02	36.59	0.94
149	16.38	31.86	1.60	**194**	22.78	38.45	1.93	**239**	20.52	35.79	1.99
150	16.22	32.41	1.42	**195**	23.30	38.56	2.10	**240**	20.39	35.67	1.17
151	17.07	32.68	1.70	**196**	23.10	38.57	1.24	**241**	20.44	35.99	1.91
152	17.06	32.93	1.16	**197**	23.61	39.00	1.30	**242**	19.96	34.92	2.75
153	17.25	32.94	2.83	**198**	23.29	39.35	0.73	**243**	19.63	35.06	3.11
154	18.12	32.92	1.30	**199**	23.56	38.86	1.13	**244**	18.74	34.67	1.05
155	18.71	33.22	2.94	**200**	23.38	38.47	1.12	**245**	18.48	34.04	1.11
156	18.18	33.82	2.45	**201**	23.33	38.32	1.43	**246**	18.52	33.47	1.97
157	18.44	33.89	1.39	**202**	23.69	38.80	0.68	**247**	17.94	33.93	0.94
158	19.12	33.20	3.62	**203**	23.34	39.11	1.69	**248**	17.62	33.62	3.03
159	19.78	33.14	1.40	**204**	23.51	38.76	1.57	**249**	17.67	33.49	0.91
160	20.04	34.38	1.92	**205**	23.49	38.39	1.53	**250**	16.99	33.27	1.29
161	19.89	34.50	1.83	**206**	23.39	38.71	2.21	**251**	16.79	33.44	0.71
162	19.68	34.52	2.23	**207**	22.84	38.58	2.04	**252**	17.03	32.89	0.24
163	19.25	34.13	2.40	**208**	23.62	38.75	1.35	**253**	16.48	32.98	1.59
164	19.84	34.68	2.57	**209**	22.89	38.96	1.06	**254**	16.77	32.36	1.32
165	20.05	34.42	3.50	**210**	22.45	38.78	1.05	**255**	17.05	32.52	0.90
166	20.11	35.64	1.74	**211**	22.67	38.60	1.18	**256**	17.42	32.99	0.80
167	19.93	35.66	1.73	**212**	22.77	38.60	0.68	**257**	17.56	32.01	3.18
168	20.56	34.76	1.94	**213**	22.29	38.11	3.22	**258**	16.95	32.08	1.88
169	20.79	36.32	2.11	**214**	22.42	37.84	1.68	**259**	17.01	32.56	1.55
170	20.54	35.94	2.63	**215**	22.29	37.58	1.33	**260**	17.06	32.43	1.17
171	20.79	35.54	2.23	**216**	22.11	37.09	3.75	**261**	17.20	31.67	0.80
172	20.15	35.95	1.69	**217**	22.10	36.86	1.25	**262**	16.68	31.28	1.67
173	20.62	35.66	2.10	**218**	21.87	36.85	1.88	**263**	16.31	31.65	1.81
174	20.59	36.05	3.19	**219**	21.74	36.90	0.99	**264**	15.64	31.23	0.50
175	20.34	36.02	3.73	**220**	22.09	37.02	1.32	**265**	16.38	31.17	1.32
176	21.29	36.28	2.84	**221**	21.99	36.73	2.14	**266**	16.38	30.56	0.94
177	21.43	36.06	3.43	**222**	21.39	36.29	2.00	**267**	16.25	30.93	1.00
178	21.17	36.16	2.83	**223**	21.33	37.19	2.04	**268**	15.38	30.11	0.83
179	21.26	36.22	1.22	**224**	21.51	37.34	1.92	**269**	15.56	30.55	1.53
180	20.95	37.19	1.52	**225**	21.68	37.11	1.30	**270**	15.18	29.62	2.37

Beaver Scenario A2											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
271	14.22	29.37	1.30	**316**	1.76	19.27	0.48	**361**	-4.59	11.77	0.82
272	13.91	30.27	0.85	**317**	2.21	18.89	1.43	**362**	-4.73	12.34	0.30
273	13.39	29.16	1.14	**318**	1.16	19.60	0.79	**363**	-3.97	12.01	0.93
274	12.55	27.83	1.36	**319**	1.20	18.60	0.88	**364**	-5.11	11.97	1.02
275	12.22	28.02	1.54	**320**	1.46	18.09	0.50	**365**	-4.27	12.16	0.85
276	12.22	27.28	1.19	**321**	0.56	17.27	0.68				
277	11.74	26.53	2.29	**322**	-0.06	17.84	0.77				
278	11.24	27.22	0.19	**323**	0.23	17.52	1.16				
279	10.93	26.33	0.86	**324**	0.64	17.91	1.15				
280	9.85	27.01	0.13	**325**	-0.52	16.70	0.55				
281	9.58	26.20	1.84	**326**	-0.29	16.35	0.96				
282	10.33	25.81	1.26	**327**	0.06	16.71	0.47				
283	11.02	25.31	1.65	**328**	0.50	16.27	0.46				
284	10.00	26.14	1.17	**329**	0.13	15.14	0.34				
285	8.87	25.64	2.15	**330**	-0.98	14.72	0.64				
286	9.00	24.43	2.36	**331**	-1.25	15.80	0.64				
287	8.92	25.80	0.83	**332**	-1.57	15.78	1.31				
288	7.68	25.33	0.47	**333**	-1.46	14.77	0.87				
289	7.94	24.99	0.06	**334**	-1.04	14.06	1.46				
290	8.10	24.23	1.04	**335**	-2.45	14.55	1.26				
291	7.98	25.04	1.61	**336**	-2.47	13.97	0.66				
292	7.60	24.16	2.38	**337**	-2.36	12.63	0.52				
293	6.94	23.52	0.79	**338**	-3.85	11.89	0.84				
294	6.77	23.66	2.25	**339**	-3.67	11.98	1.01				
295	6.15	23.40	1.01	**340**	-4.60	11.79	0.64				
296	6.81	23.14	0.89	**341**	-4.01	12.00	0.57				
297	6.49	23.81	0.56	**342**	-3.73	11.58	0.89				
298	6.71	22.61	0.40	**343**	-3.85	10.63	0.52				
299	6.25	22.26	0.13	**344**	-4.92	9.86	0.23				
300	5.67	21.35	0.75	**345**	-5.17	11.55	0.49				
301	5.57	22.26	1.59	**346**	-5.13	10.87	0.41				
302	5.23	20.84	0.51	**347**	-5.21	11.33	0.42				
303	4.66	21.75	0.97	**348**	-4.31	10.82	1.70				
304	4.79	22.30	0.68	**349**	-4.63	10.64	0.42				
305	4.65	21.76	0.63	**350**	-4.53	10.78	0.69				
306	4.29	21.93	1.03	**351**	-4.59	11.60	0.72				
307	4.69	21.17	0.84	**352**	-4.17	10.09	0.25				
308	3.30	21.36	0.86	**353**	-4.22	10.57	0.67				
309	3.53	20.53	1.01	**354**	-4.95	10.25	0.88				
310	2.68	20.32	0.69	**355**	-4.15	11.20	1.00				
311	3.74	19.14	0.61	**356**	-4.08	12.02	0.56				
312	3.42	18.56	1.37	**357**	-4.27	11.94	1.02				
313	2.60	19.23	1.48	**358**	-4.65	11.25	0.49				
314	2.07	18.65	0.97	**359**	-4.68	10.95	0.25				
315	1.51	18.68	1.18	**360**	-4.72	10.68	0.64				

Beaver Scenario B1											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
1	-4.79	12.06	0.64	**46**	-4.22	12.86	0.58	**91**	3.44	21.47	0.91
2	-4.77	11.06	0.66	**47**	-3.22	12.43	0.34	**92**	4.89	21.96	1.47
3	-4.79	10.99	0.65	**48**	-3.84	12.99	0.41	**93**	4.57	20.23	2.14
4	-5.28	10.91	0.57	**49**	-3.43	12.05	0.35	**94**	4.01	21.50	1.63
5	-5.55	10.88	0.33	**50**	-3.58	11.67	0.72	**95**	4.51	21.61	1.14
6	-5.09	11.07	0.57	**51**	-3.65	12.16	0.68	**96**	5.45	22.16	0.74
7	-5.36	11.18	0.34	**52**	-4.40	11.16	1.00	**97**	5.15	20.71	1.72
8	-5.66	10.81	0.44	**53**	-4.03	12.27	0.57	**98**	5.57	21.59	1.13
9	-5.57	12.42	0.78	**54**	-4.16	14.16	0.73	**99**	5.51	22.61	0.63
10	-5.32	11.99	0.87	**55**	-3.21	13.29	0.44	**100**	4.84	22.62	1.30
11	-4.69	10.26	0.54	**56**	-2.59	12.10	0.82	**101**	5.35	22.49	1.96
12	-4.99	10.87	0.38	**57**	-2.96	12.03	0.48	**102**	5.58	22.16	0.81
13	-5.55	10.69	0.24	**58**	-2.27	11.36	0.71	**103**	6.02	22.77	0.86
14	-5.23	10.58	0.57	**59**	-2.66	13.43	0.68	**104**	5.54	23.28	1.85
15	-5.52	11.06	0.45	**60**	-1.53	15.24	0.35	**105**	6.75	23.70	1.79
16	-5.22	12.33	0.26	**61**	-1.48	15.85	0.32	**106**	6.57	24.19	0.89
17	-4.77	11.24	0.21	**62**	-0.98	17.21	0.34	**107**	6.06	24.47	1.30
18	-4.41	11.69	0.15	**63**	-0.82	16.83	0.88	**108**	6.93	23.04	1.09
19	-4.91	12.02	0.76	**64**	-0.84	15.70	0.74	**109**	5.90	22.76	1.17
20	-5.17	11.68	0.28	**65**	-0.21	15.56	0.31	**110**	5.95	23.39	1.15
21	-4.86	12.13	0.42	**66**	-0.47	15.88	0.35	**111**	7.49	23.52	1.77
22	-4.49	11.60	0.27	**67**	-0.23	15.86	1.04	**112**	6.91	22.83	1.54
23	-4.88	11.89	0.43	**68**	-0.08	17.20	0.99	**113**	7.03	24.61	2.49
24	-4.23	12.35	0.56	**69**	-0.39	16.02	1.67	**114**	7.65	24.86	1.24
25	-4.46	12.75	0.18	**70**	0.47	16.96	0.45	**115**	7.55	25.03	1.11
26	-5.14	12.28	0.47	**71**	1.15	17.33	0.84	**116**	8.86	26.29	1.28
27	-4.94	12.28	0.36	**72**	0.96	18.00	0.88	**117**	8.52	24.97	1.29
28	-4.81	12.80	0.30	**73**	1.24	18.23	1.19	**118**	8.05	24.91	1.96
29	-4.46	12.61	0.59	**74**	0.45	19.53	1.19	**119**	9.32	27.17	1.63
30	-4.88	11.93	0.16	**75**	0.69	17.71	1.53	**120**	9.61	26.81	0.92
31	-4.26	12.43	0.72	**76**	1.54	17.02	1.41	**121**	9.45	26.37	1.21
32	-4.49	13.03	0.14	**77**	1.51	17.06	1.95	**122**	9.74	26.76	1.19
33	-4.99	13.15	0.16	**78**	2.41	18.54	1.68	**123**	9.47	28.04	1.17
34	-4.59	11.15	0.31	**79**	2.38	17.89	2.23	**124**	10.71	28.15	1.02
35	-4.91	12.51	0.22	**80**	2.14	19.99	0.72	**125**	11.39	28.20	1.48
36	-4.25	11.82	0.34	**81**	2.19	19.17	1.25	**126**	10.81	28.14	0.87
37	-4.07	11.84	0.19	**82**	2.09	19.83	1.30	**127**	10.95	28.82	0.40
38	-3.40	11.25	0.58	**83**	2.37	20.33	0.45	**128**	10.27	28.10	0.90
39	-4.14	12.59	0.45	**84**	2.68	20.20	0.70	**129**	11.13	28.36	1.88
40	-4.40	11.89	0.24	**85**	2.34	19.92	1.20	**130**	12.02	29.17	1.33
41	-4.84	11.55	0.36	**86**	2.69	19.77	1.54	**131**	12.28	28.49	1.24
42	-4.11	12.85	0.48	**87**	3.77	19.64	0.98	**132**	12.20	28.67	1.43
43	-4.31	12.69	0.23	**88**	3.18	19.51	1.87	**133**	11.99	30.26	1.49
44	-4.01	13.12	0.64	**89**	4.12	19.90	1.57	**134**	12.36	29.48	1.38
45	-4.51	12.98	0.19	**90**	4.07	21.05	0.75	**135**	12.49	29.23	1.03

Beaver Scenario B1											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
136	12.68	30.19	2.14	**181**	20.87	36.14	2.91	**226**	21.27	36.94	1.13
137	13.25	29.65	1.07	**182**	20.51	36.22	1.03	**227**	21.72	36.67	1.81
138	13.85	29.95	1.71	**183**	21.43	37.05	2.32	**228**	21.43	36.81	2.39
139	13.09	29.57	1.65	**184**	21.56	37.68	1.13	**229**	21.33	35.95	1.51
140	13.56	30.54	1.43	**185**	21.79	37.49	1.41	**230**	21.11	36.08	2.81
141	13.84	30.30	1.78	**186**	22.65	37.90	1.35	**231**	21.31	37.15	2.79
142	13.50	30.76	2.61	**187**	22.63	37.94	1.09	**232**	21.06	36.25	3.31
143	14.24	30.51	1.66	**188**	22.35	38.19	1.56	**233**	20.91	36.04	2.06
144	14.03	29.59	1.75	**189**	22.86	37.22	1.81	**234**	21.23	35.19	3.38
145	14.38	30.50	2.93	**190**	22.80	37.44	2.75	**235**	20.96	35.54	2.26
146	14.50	30.52	1.67	**191**	22.92	38.50	0.89	**236**	20.84	35.81	2.88
147	15.33	31.37	0.73	**192**	22.71	38.67	0.92	**237**	20.96	36.39	2.96
148	15.21	31.14	1.11	**193**	22.44	38.28	2.04	**238**	20.67	36.24	0.88
149	15.60	31.07	1.75	**194**	22.25	37.93	2.03	**239**	20.18	35.46	1.86
150	15.43	31.62	1.56	**195**	22.77	38.04	2.21	**240**	20.05	35.33	1.09
151	16.28	31.89	1.86	**196**	22.56	38.04	1.30	**241**	20.10	35.66	1.79
152	16.25	32.13	1.29	**197**	23.09	38.48	1.36	**242**	19.63	34.59	2.57
153	16.42	32.14	3.13	**198**	22.76	38.82	0.77	**243**	19.31	34.73	2.90
154	17.28	32.11	1.44	**199**	23.03	38.34	1.19	**244**	18.43	34.35	0.94
155	17.86	32.40	3.27	**200**	22.85	37.94	1.18	**245**	18.17	33.72	0.99
156	17.34	32.99	2.72	**201**	22.80	37.79	1.50	**246**	18.22	33.16	1.76
157	17.60	33.07	1.54	**202**	23.17	38.26	0.71	**247**	17.65	33.63	0.83
158	18.28	32.38	4.01	**203**	22.80	38.58	1.78	**248**	17.33	33.33	2.72
159	18.96	32.32	1.56	**204**	22.99	38.24	1.65	**249**	17.39	33.19	0.81
160	19.23	33.56	2.13	**205**	22.97	37.86	1.61	**250**	16.71	32.99	1.15
161	19.08	33.67	2.03	**206**	22.88	38.19	2.32	**251**	16.51	33.15	0.63
162	18.89	33.69	2.47	**207**	22.31	38.06	2.15	**252**	16.76	32.61	0.22
163	18.46	33.31	2.67	**208**	23.10	38.24	1.41	**253**	16.21	32.71	1.43
164	19.06	33.86	2.85	**209**	22.39	38.46	1.11	**254**	16.51	32.08	1.18
165	19.27	33.62	3.88	**210**	21.95	38.28	1.11	**255**	16.79	32.24	0.81
166	19.34	34.86	1.94	**211**	22.19	38.12	1.24	**256**	17.16	32.72	0.72
167	19.16	34.90	1.91	**212**	22.30	38.13	0.72	**257**	17.30	31.75	2.84
168	19.79	34.00	2.15	**213**	21.84	37.65	3.01	**258**	16.68	31.81	1.68
169	20.03	35.59	2.33	**214**	21.98	37.40	1.57	**259**	16.74	32.29	1.38
170	19.78	35.21	2.92	**215**	21.85	37.15	1.24	**260**	16.80	32.17	1.05
171	20.04	34.82	2.48	**216**	21.69	36.66	3.51	**261**	16.95	31.41	0.71
172	19.40	35.25	1.87	**217**	21.69	36.44	1.17	**262**	16.42	31.02	1.50
173	19.89	34.96	2.33	**218**	21.46	36.44	1.76	**263**	16.05	31.41	1.62
174	19.86	35.35	3.53	**219**	21.34	36.49	0.93	**264**	15.39	30.98	0.45
175	19.62	35.34	4.13	**220**	21.69	36.62	1.23	**265**	16.12	30.92	1.18
176	20.59	35.60	3.15	**221**	21.60	36.34	2.00	**266**	16.13	30.32	0.84
177	20.73	35.39	3.80	**222**	21.00	35.90	1.86	**267**	16.01	30.70	0.90
178	20.48	35.49	3.14	**223**	20.94	36.81	1.90	**268**	15.14	29.87	0.74
179	20.58	35.56	1.35	**224**	21.13	36.96	1.79	**269**	15.32	30.33	1.37
180	20.29	36.52	1.69	**225**	21.30	36.72	1.21	**270**	14.95	29.39	2.12

Beaver Scenario B1											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
271	13.99	29.16	1.17	**316**	1.53	19.04	0.51	**361**	-4.84	11.52	0.85
272	13.68	30.06	0.76	**317**	1.99	18.66	1.54	**362**	-4.97	12.10	0.31
273	13.18	28.95	1.03	**318**	0.93	19.38	0.85	**363**	-4.19	11.79	0.95
274	12.35	27.63	1.34	**319**	0.97	18.35	0.95	**364**	-5.33	11.75	1.04
275	12.03	27.82	1.52	**320**	1.22	17.85	0.54	**365**	-4.48	11.96	0.87
276	12.03	27.09	1.18	**321**	0.31	17.04	0.73				
277	11.55	26.35	2.26	**322**	-0.30	17.60	0.83				
278	11.06	27.05	0.19	**323**	-0.01	17.28	1.25				
279	10.74	26.15	0.85	**324**	0.40	17.67	1.24				
280	9.68	26.84	0.12	**325**	-0.75	16.46	0.59				
281	9.41	26.02	1.82	**326**	-0.53	16.11	1.04				
282	10.16	25.64	1.25	**327**	-0.19	16.46	0.51				
283	10.86	25.15	1.62	**328**	0.26	16.04	0.50				
284	9.84	25.99	1.15	**329**	-0.12	14.90	0.36				
285	8.72	25.49	2.13	**330**	-1.21	14.47	0.68				
286	8.85	24.29	2.33	**331**	-1.49	15.56	0.69				
287	8.79	25.65	0.82	**332**	-1.81	15.54	1.40				
288	7.54	25.19	0.46	**333**	-1.70	14.51	0.93				
289	7.81	24.85	0.06	**334**	-1.29	13.81	1.55				
290	7.96	24.08	1.03	**335**	-2.69	14.29	1.34				
291	7.84	24.90	1.59	**336**	-2.73	13.71	0.70				
292	7.45	24.01	2.35	**337**	-2.62	12.37	0.55				
293	6.80	23.37	0.78	**338**	-4.11	11.64	0.89				
294	6.61	23.52	2.22	**339**	-3.93	11.72	1.07				
295	6.00	23.23	1.00	**340**	-4.86	11.54	0.68				
296	6.64	22.99	0.88	**341**	-4.27	11.74	0.60				
297	6.33	23.64	0.55	**342**	-3.99	11.32	0.94				
298	6.56	22.45	0.40	**343**	-4.10	10.37	0.54				
299	6.08	22.09	0.13	**344**	-5.18	9.59	0.24				
300	5.50	21.17	0.74	**345**	-5.43	11.29	0.51				
301	5.40	22.09	1.57	**346**	-5.39	10.62	0.43				
302	5.05	20.65	0.51	**347**	-5.47	11.07	0.44				
303	4.48	21.57	0.96	**348**	-4.57	10.57	1.78				
304	4.61	22.11	0.68	**349**	-4.89	10.39	0.43				
305	4.46	21.57	0.64	**350**	-4.79	10.52	0.72				
306	4.09	21.74	1.06	**351**	-4.84	11.33	0.75				
307	4.50	20.97	0.87	**352**	-4.43	9.83	0.26				
308	3.10	21.16	0.90	**353**	-4.48	10.31	0.70				
309	3.33	20.33	1.06	**354**	-5.21	9.98	0.92				
310	2.47	20.12	0.72	**355**	-4.41	10.95	1.04				
311	3.53	18.93	0.64	**356**	-4.34	11.76	0.58				
312	3.21	18.34	1.44	**357**	-4.53	11.68	1.06				
313	2.38	19.01	1.56	**358**	-4.91	11.00	0.51				
314	1.85	18.43	1.03	**359**	-4.93	10.70	0.25				
315	1.29	18.46	1.26	**360**	-4.97	10.42	0.66				

Woodward Scenario A1B											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
1	-1.69	11.85	0.50	**46**	-0.61	12.23	0.85	**91**	7.25	22.38	0.96
2	-1.67	12.48	0.07	**47**	-0.39	12.82	1.27	**92**	7.87	21.93	3.46
3	-1.55	11.90	0.48	**48**	0.10	13.14	1.72	**93**	7.44	21.89	0.98
4	-1.68	11.49	1.20	**49**	-0.74	13.04	0.67	**94**	7.50	22.27	2.18
5	-1.79	11.87	1.32	**50**	-0.87	12.92	0.47	**95**	7.15	21.71	1.54
6	-2.59	11.70	0.61	**51**	0.02	14.30	1.21	**96**	8.30	22.44	1.32
7	-2.64	12.32	1.12	**52**	-0.15	12.67	1.57	**97**	8.08	23.12	1.27
8	-2.13	11.41	0.68	**53**	-0.14	13.47	1.48	**98**	8.34	21.52	2.60
9	-1.81	12.63	0.63	**54**	-0.82	12.86	1.18	**99**	8.13	23.19	1.91
10	-1.68	12.74	0.91	**55**	0.14	13.14	1.08	**100**	9.02	22.33	1.67
11	-2.07	12.07	0.86	**56**	-0.72	13.20	0.83	**101**	8.49	23.60	2.62
12	-0.90	11.61	0.92	**57**	-0.21	13.74	0.83	**102**	9.60	22.93	1.81
13	-1.75	12.19	0.19	**58**	-0.09	12.57	1.27	**103**	9.69	23.78	1.93
14	-2.21	12.41	0.70	**59**	0.81	13.38	1.28	**104**	9.35	24.08	1.89
15	-2.27	12.67	1.33	**60**	2.40	15.02	1.44	**105**	9.56	22.98	0.90
16	-1.79	12.78	0.54	**61**	1.72	16.16	1.04	**106**	10.44	24.67	1.30
17	-3.04	12.30	0.24	**62**	1.83	16.16	1.27	**107**	9.99	24.79	1.14
18	-2.12	11.78	0.45	**63**	2.16	16.86	1.42	**108**	9.90	24.74	2.17
19	-2.13	12.24	0.37	**64**	3.61	18.13	1.52	**109**	9.52	24.50	3.23
20	-1.92	12.32	0.45	**65**	4.22	17.59	1.79	**110**	11.18	24.03	2.59
21	-1.03	11.70	0.41	**66**	2.85	18.71	0.78	**111**	11.06	24.48	2.11
22	-1.74	12.39	0.55	**67**	2.83	17.66	2.79	**112**	10.58	24.16	2.83
23	-2.22	12.88	0.21	**68**	3.77	17.61	0.94	**113**	10.62	25.32	1.57
24	-1.67	13.00	1.06	**69**	4.65	18.29	1.49	**114**	10.96	25.58	2.65
25	-2.29	13.10	1.24	**70**	4.33	18.98	1.45	**115**	12.04	25.88	0.66
26	-2.15	12.70	0.96	**71**	3.62	19.93	1.41	**116**	11.14	24.97	3.03
27	-2.00	12.27	1.05	**72**	4.12	18.77	1.94	**117**	11.48	25.38	3.65
28	-2.13	12.15	0.50	**73**	4.51	18.28	1.66	**118**	11.83	26.09	1.95
29	-1.03	12.78	0.94	**74**	4.50	19.04	1.46	**119**	11.32	26.92	2.41
30	-1.57	12.34	0.79	**75**	4.20	19.47	1.37	**120**	12.36	26.92	1.35
31	-0.80	13.23	0.41	**76**	4.81	19.57	1.36	**121**	12.76	25.82	3.06
32	-0.88	13.18	1.25	**77**	5.14	19.22	2.90	**122**	12.95	26.67	1.08
33	-1.49	12.56	0.40	**78**	5.60	18.27	1.87	**123**	13.41	26.35	2.23
34	-0.62	12.33	0.19	**79**	5.75	18.48	0.61	**124**	13.41	27.23	2.05
35	-0.79	12.68	0.33	**80**	5.01	18.10	1.40	**125**	13.87	27.74	1.68
36	-0.34	13.46	0.33	**81**	4.78	20.04	1.20	**126**	13.42	28.06	3.97
37	-0.60	14.43	0.60	**82**	5.86	19.92	1.44	**127**	13.02	27.57	1.50
38	-0.86	13.77	0.82	**83**	5.89	20.40	1.24	**128**	14.03	28.09	2.09
39	-0.72	13.87	0.50	**84**	6.14	20.62	1.47	**129**	14.69	28.32	0.97
40	-0.25	12.88	1.07	**85**	5.73	19.99	1.01	**130**	15.25	27.44	2.13
41	-0.84	13.24	0.65	**86**	6.35	20.62	1.02	**131**	14.92	28.95	2.25
42	0.30	12.17	1.49	**87**	6.99	21.12	1.33	**132**	14.17	28.96	1.98
43	-0.02	12.12	0.80	**88**	6.56	20.09	1.79	**133**	14.23	28.47	3.24
44	-0.28	13.48	0.64	**89**	6.64	21.43	1.87	**134**	14.59	28.86	0.86
45	-1.07	13.15	0.30	**90**	6.36	21.70	1.56	**135**	14.56	29.35	2.95

Woodward Scenario A1B											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
136	15.38	28.50	5.51	**181**	22.68	35.87	2.28	**226**	23.33	36.08	2.41
137	16.40	28.90	1.89	**182**	23.34	36.26	3.14	**227**	23.17	36.22	1.60
138	16.18	29.61	3.53	**183**	23.55	36.66	2.38	**228**	22.82	36.08	2.98
139	15.73	29.21	2.00	**184**	23.56	36.71	1.36	**229**	22.95	36.37	2.26
140	16.14	29.44	1.54	**185**	23.33	36.18	4.33	**230**	22.93	36.39	1.86
141	15.88	29.36	3.43	**186**	23.63	36.79	2.13	**231**	22.89	36.42	3.92
142	16.04	29.16	2.92	**187**	24.00	38.08	1.01	**232**	23.13	36.78	2.45
143	16.22	29.74	2.57	**188**	24.22	37.90	3.30	**233**	23.18	36.61	3.10
144	17.25	30.10	3.78	**189**	24.69	37.99	2.87	**234**	23.04	36.13	1.95
145	17.85	30.17	2.23	**190**	24.70	37.79	2.38	**235**	22.53	36.40	2.98
146	17.26	31.21	1.66	**191**	24.53	37.55	2.21	**236**	22.67	35.96	3.06
147	17.35	30.25	2.05	**192**	24.39	37.72	2.87	**237**	22.63	35.70	4.50
148	18.08	31.10	0.90	**193**	24.57	37.85	2.60	**238**	22.64	35.17	4.04
149	17.97	30.86	2.81	**194**	24.74	37.97	0.95	**239**	22.01	35.13	2.81
150	17.81	31.18	2.62	**195**	24.69	37.08	0.97	**240**	21.79	35.96	3.59
151	18.00	31.94	1.90	**196**	24.30	37.80	2.01	**241**	21.33	34.88	1.36
152	17.97	32.49	2.05	**197**	24.56	37.39	1.35	**242**	21.76	34.20	3.23
153	19.02	31.45	4.96	**198**	24.83	37.15	1.24	**243**	21.03	33.99	1.55
154	19.20	31.16	4.08	**199**	25.22	37.50	1.34	**244**	20.88	33.27	1.97
155	20.15	32.17	1.90	**200**	25.03	37.10	1.72	**245**	20.18	32.99	2.17
156	19.87	32.27	1.96	**201**	24.82	37.01	1.99	**246**	19.55	33.43	0.44
157	19.81	31.90	3.09	**202**	24.53	37.31	2.11	**247**	19.45	33.50	1.45
158	19.81	32.20	3.46	**203**	24.37	37.52	3.28	**248**	20.04	32.97	0.59
159	19.86	32.27	3.26	**204**	24.57	37.88	1.16	**249**	19.68	32.63	0.33
160	21.14	32.68	3.23	**205**	24.42	37.57	2.41	**250**	19.40	32.84	1.92
161	21.32	33.08	2.27	**206**	24.36	37.36	2.07	**251**	19.07	32.29	1.87
162	20.61	32.98	2.41	**207**	24.81	37.14	1.94	**252**	19.05	32.26	2.18
163	21.93	33.64	1.89	**208**	24.93	36.70	1.29	**253**	18.29	32.36	1.45
164	21.12	33.35	3.62	**209**	24.71	37.18	1.58	**254**	18.25	31.25	2.63
165	21.28	33.75	4.00	**210**	24.02	37.50	2.36	**255**	18.98	31.97	2.66
166	21.40	33.94	1.85	**211**	24.41	37.25	1.97	**256**	18.94	31.26	1.98
167	21.26	34.38	1.97	**212**	24.12	37.26	3.05	**257**	18.38	31.21	1.06
168	21.64	34.36	2.72	**213**	24.00	36.74	3.19	**258**	17.80	31.58	0.49
169	21.86	34.54	2.22	**214**	24.12	36.70	1.12	**259**	17.32	31.25	1.31
170	22.00	34.34	2.80	**215**	23.71	36.41	2.23	**260**	17.59	30.79	0.67
171	21.64	34.91	5.64	**216**	23.01	36.94	2.03	**261**	17.26	29.76	2.05
172	21.52	34.40	5.78	**217**	23.78	36.66	2.55	**262**	16.40	30.06	1.64
173	22.07	34.60	2.66	**218**	23.27	36.82	1.93	**263**	16.33	31.06	2.44
174	22.06	35.11	1.25	**219**	23.06	37.14	2.84	**264**	16.18	29.86	2.51
175	21.82	35.26	2.84	**220**	22.97	35.98	2.56	**265**	16.01	29.29	2.73
176	21.79	34.52	4.24	**221**	23.23	35.78	1.25	**266**	15.59	28.48	1.91
177	22.03	34.50	3.68	**222**	23.58	36.10	2.29	**267**	15.77	29.50	2.60
178	22.17	34.90	3.64	**223**	23.68	36.75	0.77	**268**	15.67	29.97	2.71
179	22.58	35.62	1.32	**224**	23.12	36.65	2.70	**269**	15.58	28.96	2.08
180	22.11	35.66	2.90	**225**	23.42	36.27	0.79	**270**	14.73	28.83	1.97

Woodward Scenario A1B											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
271	14.99	28.20	2.36	**316**	6.09	19.64	0.51	**361**	-1.62	11.06	0.60
272	15.37	28.57	3.07	**317**	5.74	19.91	1.00	**362**	-1.43	10.65	0.77
273	14.32	27.42	0.86	**318**	4.64	18.56	0.29	**363**	-1.75	11.58	0.46
274	13.99	27.23	2.03	**319**	4.52	17.73	0.73	**364**	-1.86	11.13	0.67
275	13.50	27.69	2.19	**320**	4.00	18.46	0.27	**365**	-1.59	11.43	1.06
276	13.46	27.22	1.62	**321**	4.11	18.72	0.57				
277	13.37	27.30	1.81	**322**	3.55	19.26	0.43				
278	13.33	27.17	4.44	**323**	3.07	18.53	0.45				
279	13.47	26.45	2.24	**324**	3.98	16.81	1.29				
280	12.65	26.49	1.17	**325**	2.96	17.21	1.11				
281	12.23	26.80	3.00	**326**	3.21	18.44	0.40				
282	12.29	26.55	2.90	**327**	2.90	17.32	0.52				
283	11.16	25.21	1.39	**328**	3.49	16.91	0.51				
284	11.66	24.17	2.53	**329**	2.57	15.69	1.95				
285	11.80	24.22	3.58	**330**	2.92	16.26	0.31				
286	10.90	24.36	1.01	**331**	2.13	16.70	0.35				
287	11.10	24.70	1.30	**332**	2.59	15.15	1.70				
288	10.55	25.25	2.70	**333**	2.35	14.93	0.89				
289	10.26	23.05	2.14	**334**	1.08	14.73	0.82				
290	10.32	23.74	2.67	**335**	-0.10	14.02	0.73				
291	10.27	23.63	3.08	**336**	0.52	13.46	0.37				
292	10.39	23.78	1.51	**337**	-0.41	13.50	0.42				
293	9.60	22.79	1.09	**338**	-0.82	12.81	1.46				
294	9.64	23.86	3.82	**339**	-0.57	11.81	1.32				
295	9.20	23.83	4.81	**340**	-0.76	11.71	0.48				
296	9.01	23.23	0.83	**341**	-0.82	11.62	0.52				
297	9.27	22.17	2.99	**342**	-1.20	11.79	0.38				
298	8.82	22.95	3.09	**343**	-0.78	12.09	1.09				
299	8.36	21.64	2.31	**344**	-1.53	11.88	0.26				
300	8.41	21.65	3.18	**345**	-2.38	11.31	0.66				
301	7.81	21.56	1.09	**346**	-1.30	11.61	0.78				
302	7.37	22.07	1.36	**347**	-1.13	11.44	1.06				
303	7.16	21.79	2.27	**348**	-2.12	10.64	0.90				
304	6.96	20.22	1.88	**349**	-1.51	10.41	0.29				
305	7.40	20.57	1.27	**350**	-1.47	10.33	0.87				
306	6.41	20.59	1.57	**351**	-1.44	10.49	0.78				
307	7.03	21.03	2.79	**352**	-2.22	11.11	1.36				
308	6.38	20.37	2.04	**353**	-2.19	11.26	0.47				
309	6.23	20.70	0.54	**354**	-1.93	11.52	0.87				
310	6.29	20.24	1.46	**355**	-1.40	11.81	0.22				
311	6.25	20.86	1.30	**356**	-0.53	11.77	0.29				
312	6.68	20.13	0.47	**357**	-2.14	12.13	0.50				
313	5.38	19.84	0.82	**358**	-1.69	12.35	1.20				
314	4.96	18.94	1.35	**359**	-1.13	11.33	1.65				
315	5.06	19.01	0.54	**360**	-0.96	11.20	1.14				

Woodward Scenario A2											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
1	-2.05	10.92	0.61	**46**	-1.13	12.62	0.91	**91**	7.54	22.23	2.38
2	-2.11	11.22	0.70	**47**	-1.33	12.45	1.07	**92**	6.81	20.78	1.94
3	-2.20	11.26	1.38	**48**	-1.51	12.83	1.19	**93**	7.19	21.23	0.94
4	-2.65	10.62	1.25	**49**	-0.90	12.03	0.64	**94**	6.97	21.12	1.62
5	-2.48	11.56	0.19	**50**	-1.13	12.32	0.95	**95**	7.21	20.86	2.72
6	-2.49	11.44	1.13	**51**	-1.28	11.28	2.32	**96**	7.80	22.29	3.43
7	-2.50	10.30	0.15	**52**	-1.37	12.29	1.29	**97**	7.99	22.12	2.07
8	-2.34	11.16	0.31	**53**	-1.31	12.04	0.72	**98**	8.89	22.92	3.58
9	-2.54	12.15	1.55	**54**	-0.50	11.45	1.91	**99**	9.22	22.89	1.98
10	-2.75	10.97	0.85	**55**	-0.83	12.14	0.49	**100**	8.99	23.67	1.31
11	-2.63	11.18	0.89	**56**	-0.72	12.69	0.90	**101**	8.83	24.41	1.73
12	-3.00	12.70	0.73	**57**	-0.17	14.16	1.28	**102**	8.95	24.22	1.89
13	-2.79	12.13	0.50	**58**	0.35	13.76	1.46	**103**	8.65	23.87	2.41
14	-3.06	11.73	0.57	**59**	0.86	14.20	0.84	**104**	9.69	23.68	2.65
15	-2.19	10.41	0.79	**60**	1.48	16.03	1.17	**105**	10.17	23.65	1.31
16	-3.32	10.90	0.50	**61**	2.36	16.77	0.61	**106**	8.97	22.62	3.65
17	-3.45	10.72	0.47	**62**	1.69	16.11	0.95	**107**	9.31	24.04	1.96
18	-2.68	11.69	0.74	**63**	2.16	16.58	1.15	**108**	10.14	24.05	1.74
19	-2.48	11.55	0.75	**64**	2.58	16.48	1.71	**109**	10.35	24.28	1.96
20	-2.89	12.49	0.72	**65**	3.23	17.50	0.81	**110**	10.71	24.07	1.59
21	-2.71	12.15	0.13	**66**	2.30	17.66	1.15	**111**	10.93	24.79	1.16
22	-3.18	11.57	0.65	**67**	2.97	17.20	0.93	**112**	11.18	25.41	2.65
23	-2.06	10.95	0.51	**68**	2.27	17.47	2.67	**113**	11.67	25.34	3.45
24	-1.72	11.95	0.56	**69**	2.65	17.20	1.88	**114**	12.41	25.53	2.35
25	-2.38	11.42	0.85	**70**	3.44	19.12	0.87	**115**	11.82	24.33	3.06
26	-2.62	12.18	0.86	**71**	3.53	18.68	1.66	**116**	12.78	25.70	2.47
27	-2.14	11.64	0.46	**72**	3.36	17.48	2.95	**117**	12.17	25.86	2.07
28	-1.81	11.70	1.17	**73**	3.85	18.79	1.54	**118**	12.34	26.60	2.36
29	-2.14	11.66	0.31	**74**	4.62	17.87	1.41	**119**	12.61	26.22	2.34
30	-2.10	10.86	0.78	**75**	4.36	17.55	1.71	**120**	12.76	25.83	1.24
31	-2.39	11.80	0.53	**76**	4.07	17.54	1.82	**121**	12.96	26.93	2.15
32	-2.99	11.58	0.65	**77**	4.45	17.11	1.40	**122**	13.84	26.89	1.02
33	-2.22	11.76	0.86	**78**	4.32	18.29	0.77	**123**	13.42	27.72	1.68
34	-1.80	11.80	0.36	**79**	4.37	18.90	1.52	**124**	12.38	27.77	1.36
35	-1.54	12.24	1.36	**80**	5.44	19.91	2.07	**125**	13.30	27.98	3.61
36	-2.18	12.66	0.95	**81**	7.01	20.47	0.99	**126**	13.87	27.14	1.51
37	-1.32	13.40	0.99	**82**	5.76	19.60	1.53	**127**	14.07	28.18	4.42
38	-1.51	12.42	0.83	**83**	4.59	18.37	2.09	**128**	14.54	28.49	2.16
39	-0.80	11.79	1.08	**84**	5.42	19.53	0.71	**129**	14.97	28.11	1.24
40	-1.42	11.92	1.14	**85**	5.48	19.96	1.25	**130**	14.51	28.47	1.24
41	-0.97	11.48	1.31	**86**	5.73	20.00	2.13	**131**	15.35	28.53	2.44
42	-0.98	12.04	1.07	**87**	6.55	20.25	0.98	**132**	15.30	28.75	2.92
43	-1.52	12.28	1.20	**88**	6.91	21.70	1.48	**133**	15.30	28.92	1.22
44	-1.10	12.54	0.37	**89**	6.33	21.86	2.11	**134**	15.32	28.98	2.90
45	-0.50	12.10	0.26	**90**	6.31	22.01	2.06	**135**	14.60	29.02	1.92

Woodward Scenario A2											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
136	15.25	29.45	1.70	**181**	23.17	35.30	1.36	**226**	23.00	36.43	2.30
137	15.79	29.10	1.97	**182**	23.22	35.63	3.83	**227**	23.15	36.51	3.29
138	15.69	29.41	3.58	**183**	23.17	36.77	1.94	**228**	23.09	36.30	1.59
139	15.87	29.92	1.76	**184**	23.69	37.42	1.78	**229**	22.97	36.29	1.98
140	16.06	29.23	1.66	**185**	23.71	37.58	1.88	**230**	23.40	36.26	3.27
141	16.25	29.36	3.80	**186**	24.11	37.67	2.43	**231**	23.28	37.05	0.95
142	15.90	30.10	1.90	**187**	24.03	37.20	3.25	**232**	23.17	36.85	1.78
143	16.69	30.48	3.10	**188**	24.55	37.69	1.09	**233**	23.01	36.48	3.04
144	17.75	30.42	1.68	**189**	24.10	37.13	2.76	**234**	22.81	37.42	2.63
145	17.48	29.61	3.06	**190**	24.45	37.71	1.51	**235**	22.87	36.80	1.65
146	17.25	30.59	2.32	**191**	24.67	37.15	3.48	**236**	22.62	35.96	1.57
147	17.83	31.02	2.83	**192**	24.57	37.31	5.51	**237**	22.60	35.76	1.93
148	18.23	32.03	2.50	**193**	24.87	37.83	1.51	**238**	22.81	35.89	2.13
149	18.46	30.64	2.54	**194**	25.47	37.34	2.56	**239**	22.28	35.82	2.08
150	18.61	30.94	3.50	**195**	24.82	37.59	2.08	**240**	22.14	35.53	2.63
151	18.71	31.91	2.91	**196**	24.63	37.23	1.37	**241**	21.79	34.90	1.89
152	19.31	31.78	3.27	**197**	24.73	37.41	2.16	**242**	21.29	34.63	1.28
153	20.07	32.46	2.05	**198**	25.02	37.46	2.08	**243**	21.05	34.13	1.14
154	19.74	32.36	2.42	**199**	24.34	37.26	1.99	**244**	20.72	33.84	2.32
155	19.89	33.01	2.22	**200**	24.24	37.16	2.61	**245**	20.50	33.31	1.84
156	20.21	32.58	1.98	**201**	25.05	37.40	1.12	**246**	20.63	33.53	2.00
157	20.64	32.30	2.29	**202**	25.26	37.62	1.68	**247**	19.85	33.68	2.26
158	21.30	33.30	3.09	**203**	24.76	36.92	1.16	**248**	20.07	33.08	3.46
159	21.59	32.83	3.16	**204**	24.40	37.47	2.83	**249**	19.87	33.30	1.34
160	21.78	33.03	2.33	**205**	24.33	38.48	2.12	**250**	19.61	33.01	1.00
161	21.51	33.58	2.26	**206**	24.92	38.08	3.57	**251**	19.69	32.65	1.09
162	21.53	33.75	1.66	**207**	24.55	37.90	1.55	**252**	18.76	33.40	1.48
163	21.45	34.21	3.59	**208**	24.31	37.37	2.10	**253**	18.74	33.15	1.14
164	21.48	33.64	2.38	**209**	24.30	37.34	1.56	**254**	19.10	32.90	1.90
165	21.86	33.77	1.98	**210**	24.01	36.94	2.64	**255**	18.64	31.90	1.58
166	21.23	33.83	3.68	**211**	23.71	36.84	1.61	**256**	18.10	31.67	1.15
167	21.13	33.90	3.19	**212**	23.26	36.41	0.91	**257**	18.83	31.68	1.52
168	21.43	33.61	3.57	**213**	23.76	37.76	1.20	**258**	18.69	31.40	1.36
169	21.67	34.18	3.84	**214**	23.87	37.10	3.92	**259**	18.25	31.25	1.42
170	21.77	34.35	2.70	**215**	24.04	36.27	1.51	**260**	17.70	31.64	1.92
171	21.13	34.98	2.61	**216**	23.78	36.35	1.40	**261**	16.89	30.51	2.98
172	22.32	34.74	4.09	**217**	23.33	36.17	3.09	**262**	16.92	30.04	1.48
173	22.29	34.67	1.99	**218**	23.43	36.92	1.53	**263**	17.47	30.30	4.54
174	21.99	34.76	4.22	**219**	23.74	36.90	0.63	**264**	17.24	30.35	1.11
175	22.32	34.93	2.26	**220**	23.29	37.06	1.74	**265**	16.29	29.71	2.34
176	22.54	34.67	4.18	**221**	23.58	37.13	1.39	**266**	16.66	29.15	2.13
177	22.38	35.16	1.86	**222**	23.52	36.86	1.94	**267**	16.39	29.18	1.73
178	21.82	35.53	1.59	**223**	23.70	36.93	3.09	**268**	16.08	29.41	0.95
179	22.49	35.58	2.22	**224**	23.16	37.31	1.30	**269**	15.19	29.14	2.53
180	23.04	35.88	2.35	**225**	22.99	37.00	2.25	**270**	15.48	27.45	0.30

Woodward Scenario A2											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
271	14.68	28.23	1.82	**316**	4.13	16.85	1.04	**361**	-2.31	10.65	0.68
272	14.74	28.56	2.01	**317**	5.14	17.65	1.36	**362**	-2.18	10.64	0.34
273	13.88	28.37	1.46	**318**	5.33	18.83	0.34	**363**	-2.22	11.65	0.53
274	13.27	27.09	1.04	**319**	4.35	18.45	0.37	**364**	-2.33	11.27	0.85
275	12.41	27.43	1.37	**320**	4.10	18.91	0.28	**365**	-2.58	11.02	0.98
276	13.28	27.77	1.27	**321**	3.52	18.16	0.08				
277	12.86	26.89	1.88	**322**	3.58	17.54	0.25				
278	12.60	26.83	1.52	**323**	3.16	17.12	0.44				
279	12.77	25.67	2.65	**324**	2.92	15.85	1.10				
280	12.88	26.20	1.69	**325**	3.08	16.38	2.27				
281	11.97	26.20	2.44	**326**	2.65	15.50	0.90				
282	12.25	25.10	0.80	**327**	2.30	15.39	0.84				
283	12.45	24.49	2.64	**328**	1.82	16.11	0.48				
284	12.30	24.76	3.83	**329**	2.07	16.62	0.52				
285	11.34	25.01	3.35	**330**	1.74	15.77	0.28				
286	11.04	24.91	1.29	**331**	1.94	14.23	0.75				
287	10.38	24.84	1.95	**332**	1.08	15.39	0.56				
288	10.48	24.48	2.53	**333**	1.53	13.60	0.54				
289	9.90	23.37	3.33	**334**	1.30	13.87	0.93				
290	10.12	23.80	3.21	**335**	0.02	12.92	0.93				
291	10.51	23.97	1.17	**336**	-0.08	13.05	0.58				
292	9.70	22.77	2.76	**337**	-1.15	12.81	0.41				
293	8.84	23.04	1.87	**338**	-0.88	12.96	0.87				
294	9.04	22.89	3.05	**339**	-1.50	11.86	0.46				
295	9.38	23.04	0.82	**340**	-1.23	10.76	1.02				
296	9.45	22.96	1.25	**341**	-1.94	11.88	0.15				
297	9.46	22.42	1.18	**342**	-2.22	11.73	0.49				
298	8.59	21.50	1.66	**343**	-2.13	9.93	1.14				
299	8.10	21.18	2.84	**344**	-1.92	10.80	1.41				
300	8.10	21.45	1.82	**345**	-1.15	11.66	0.82				
301	7.77	21.53	0.42	**346**	-1.07	10.97	0.68				
302	7.35	21.61	2.16	**347**	-1.50	11.31	0.31				
303	6.84	21.03	1.15	**348**	-1.90	11.19	0.47				
304	7.46	21.12	2.96	**349**	-1.62	11.18	0.78				
305	6.51	20.90	0.37	**350**	-1.25	11.21	1.18				
306	7.44	21.44	2.22	**351**	-1.74	10.57	0.76				
307	6.62	20.77	0.75	**352**	-1.69	11.79	0.48				
308	6.29	20.88	0.42	**353**	-1.76	12.51	0.27				
309	6.58	19.49	1.10	**354**	-1.89	11.69	1.05				
310	6.38	18.97	1.39	**355**	-1.15	11.31	0.91				
311	6.23	20.17	0.43	**356**	-2.05	11.23	0.68				
312	5.28	19.59	1.00	**357**	-1.81	11.31	0.50				
313	5.22	19.12	1.70	**358**	-1.47	11.58	0.81				
314	4.62	19.32	0.84	**359**	-1.78	11.30	0.53				
315	4.61	18.48	1.03	**360**	-2.61	12.21	0.75				

Woodward Scenario B1											
day	min T[℃]	max T[℃]	rain(mm)	day	min T[℃]	max T[℃]	rain(mm)	day	min T[℃]	max T[℃]	rain(mm)
1	-2.12	10.78	0.60	**46**	-1.32	12.34	0.90	**91**	6.89	21.47	2.54
2	-2.10	11.05	0.68	**47**	-1.44	12.50	1.07	**92**	5.85	20.22	2.07
3	-2.23	11.31	1.35	**48**	-1.58	12.69	1.18	**93**	6.40	20.64	1.04
4	-2.90	10.46	1.22	**49**	-1.12	11.77	0.64	**94**	6.32	20.81	1.73
5	-2.62	11.32	0.18	**50**	-1.47	11.93	0.95	**95**	6.56	20.36	2.86
6	-2.68	11.57	1.10	**51**	-1.75	10.91	2.35	**96**	7.34	21.60	3.55
7	-2.69	10.12	0.14	**52**	-1.64	12.18	1.30	**97**	7.47	21.44	2.21
8	-2.29	10.75	0.30	**53**	-1.48	11.97	0.73	**98**	8.36	22.42	3.80
9	-2.54	11.84	1.51	**54**	-0.75	11.16	1.97	**99**	8.60	22.08	2.22
10	-2.77	10.94	0.82	**55**	-1.15	11.76	0.50	**100**	8.34	22.94	1.40
11	-2.57	11.04	0.87	**56**	-1.03	12.59	0.89	**101**	8.52	23.83	1.84
12	-3.23	12.72	0.71	**57**	-0.31	14.21	1.31	**102**	8.43	23.64	1.90
13	-2.85	12.31	0.47	**58**	0.19	13.82	1.76	**103**	8.01	23.13	2.84
14	-3.18	11.71	0.55	**59**	0.53	13.95	0.87	**104**	8.97	22.92	2.79
15	-2.20	10.32	0.78	**60**	1.16	15.72	0.92	**105**	9.63	23.16	1.41
16	-3.26	10.72	0.49	**61**	1.90	16.37	0.62	**106**	8.38	22.18	3.91
17	-3.50	10.44	0.46	**62**	1.18	15.58	1.97	**107**	8.69	23.21	2.37
18	-2.79	11.43	0.73	**63**	1.71	16.10	1.13	**108**	9.50	23.22	2.01
19	-2.50	11.61	0.74	**64**	2.19	16.16	1.77	**109**	9.82	23.80	2.10
20	-2.83	12.31	0.71	**65**	2.89	16.97	0.87	**110**	10.16	23.66	1.94
21	-2.82	12.07	0.16	**66**	1.89	17.27	1.20	**111**	10.30	23.93	1.22
22	-3.31	11.56	0.63	**67**	2.48	16.76	0.99	**112**	10.44	24.71	2.59
23	-2.13	11.08	0.47	**68**	1.98	17.04	2.74	**113**	10.99	24.53	3.69
24	-1.91	12.09	0.55	**69**	2.18	16.85	1.95	**114**	11.60	25.06	2.17
25	-2.51	11.25	0.83	**70**	2.88	18.60	0.93	**115**	11.21	23.66	3.29
26	-2.77	11.91	0.84	**71**	3.14	17.99	1.71	**116**	12.05	25.07	2.60
27	-2.34	11.23	0.45	**72**	3.00	17.14	3.31	**117**	11.44	25.08	2.23
28	-2.02	11.40	1.11	**73**	3.43	18.44	1.60	**118**	11.68	25.94	2.47
29	-2.12	11.54	0.30	**74**	4.26	17.31	1.56	**119**	12.08	25.52	2.56
30	-2.22	10.79	0.74	**75**	3.90	16.98	1.85	**120**	12.22	25.15	1.35
31	-2.67	11.79	0.52	**76**	3.73	17.12	2.01	**121**	12.11	26.26	2.24
32	-3.07	11.66	0.64	**77**	3.98	16.62	1.56	**122**	13.09	26.26	1.58
33	-2.19	11.53	0.85	**78**	3.88	18.29	0.81	**123**	12.67	27.06	1.80
34	-1.89	11.83	0.35	**79**	4.02	18.79	1.62	**124**	11.73	27.15	1.54
35	-1.76	12.11	1.28	**80**	5.04	19.43	2.24	**125**	12.25	27.26	3.96
36	-2.53	12.35	0.96	**81**	6.55	19.86	1.09	**126**	13.03	26.59	1.74
37	-1.71	13.26	0.98	**82**	5.41	18.63	2.20	**127**	13.25	27.47	4.69
38	-1.50	12.28	0.79	**83**	4.23	17.62	2.24	**128**	13.78	27.94	2.24
39	-1.05	11.53	1.07	**84**	4.99	19.03	0.76	**129**	14.36	27.44	1.61
40	-1.62	11.88	1.12	**85**	5.18	19.65	1.29	**130**	14.07	27.65	1.44
41	-1.25	11.57	1.30	**86**	5.47	19.84	2.17	**131**	14.63	27.89	2.68
42	-1.22	11.71	1.08	**87**	6.02	19.87	1.04	**132**	14.58	27.98	3.06
43	-1.44	12.10	1.19	**88**	6.28	21.15	1.59	**133**	14.59	27.97	1.38
44	-1.22	12.22	0.37	**89**	5.95	21.24	2.25	**134**	14.46	28.16	3.29
45	-0.80	11.74	0.26	**90**	5.88	21.49	2.20	**135**	13.61	28.35	2.07

Woodward Scenario B1											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
136	14.40	28.68	1.92	**181**	22.61	34.83	1.36	**226**	22.65	36.08	2.11
137	14.90	28.18	2.13	**182**	22.74	35.15	3.96	**227**	22.83	36.15	3.16
138	14.76	28.64	3.79	**183**	22.75	36.22	2.00	**228**	22.77	35.92	1.45
139	15.15	29.02	1.93	**184**	23.16	36.85	1.84	**229**	22.61	35.82	1.81
140	15.32	28.32	2.11	**185**	23.18	36.98	1.94	**230**	22.98	35.96	2.98
141	15.41	28.54	4.11	**186**	23.63	37.01	2.52	**231**	22.96	36.80	0.71
142	14.99	29.29	2.02	**187**	23.65	36.88	2.93	**232**	22.76	36.29	1.83
143	15.78	29.57	3.45	**188**	24.24	37.42	1.12	**233**	22.75	36.06	2.60
144	16.99	29.86	1.70	**189**	23.72	36.69	2.75	**234**	22.48	37.13	2.42
145	16.49	28.84	3.30	**190**	24.04	37.15	1.52	**235**	22.53	36.49	1.26
146	16.41	29.85	2.30	**191**	24.20	36.77	3.60	**236**	22.35	35.68	1.44
147	17.03	30.34	3.31	**192**	24.12	36.89	5.71	**237**	22.28	35.36	1.95
148	17.41	31.25	2.74	**193**	24.38	37.31	1.68	**238**	22.47	35.59	1.94
149	17.72	30.00	2.66	**194**	24.98	36.82	2.76	**239**	21.97	35.45	1.91
150	18.04	30.27	3.51	**195**	24.33	37.09	2.16	**240**	21.76	35.10	2.81
151	18.02	31.17	3.10	**196**	24.20	36.77	1.58	**241**	21.52	34.55	1.73
152	18.53	31.07	3.65	**197**	24.30	36.92	2.23	**242**	20.89	34.28	1.28
153	19.32	31.80	2.31	**198**	24.57	37.03	2.15	**243**	20.71	33.93	1.02
154	19.02	31.63	3.12	**199**	23.91	36.78	2.06	**244**	20.23	33.63	1.70
155	19.20	32.09	2.45	**200**	23.76	36.60	2.56	**245**	20.19	33.07	1.69
156	19.48	31.70	2.24	**201**	24.74	36.99	1.16	**246**	20.37	33.24	2.00
157	19.96	31.71	2.56	**202**	24.88	37.30	1.74	**247**	19.64	33.39	2.01
158	20.50	32.57	3.81	**203**	24.37	36.45	1.17	**248**	19.85	32.70	3.42
159	20.65	32.09	3.67	**204**	24.06	36.94	2.84	**249**	19.73	33.04	1.25
160	20.95	32.42	2.60	**205**	23.83	37.99	3.14	**250**	19.43	32.90	0.87
161	20.67	32.78	2.52	**206**	24.39	37.50	3.88	**251**	19.36	32.27	1.38
162	20.69	32.96	1.77	**207**	24.03	37.41	0.72	**252**	18.48	33.21	0.79
163	20.75	33.42	3.83	**208**	23.79	36.91	2.12	**253**	18.60	32.76	1.10
164	20.83	32.92	2.61	**209**	23.78	36.75	1.62	**254**	18.95	32.56	1.70
165	21.24	33.04	2.15	**210**	23.55	36.47	2.74	**255**	18.35	31.65	1.50
166	20.55	33.09	4.11	**211**	23.30	36.39	1.64	**256**	17.70	31.44	1.42
167	20.33	33.03	3.56	**212**	22.91	35.99	0.99	**257**	18.36	31.34	1.35
168	20.75	32.78	4.08	**213**	23.29	37.36	1.16	**258**	18.21	31.20	1.03
169	20.86	33.47	4.28	**214**	23.44	36.82	3.58	**259**	17.90	30.93	1.27
170	21.05	33.72	3.00	**215**	23.72	35.76	1.53	**260**	17.33	31.26	1.71
171	20.44	34.39	2.94	**216**	23.44	35.99	1.36	**261**	16.38	30.11	3.06
172	21.66	34.10	4.39	**217**	23.01	35.94	2.76	**262**	16.31	29.60	1.31
173	21.65	33.96	2.20	**218**	23.15	36.68	1.40	**263**	17.00	30.23	3.63
174	21.35	34.04	4.71	**219**	23.40	36.70	0.58	**264**	16.98	30.29	1.00
175	21.57	34.43	2.52	**220**	22.88	36.83	1.59	**265**	15.97	29.27	2.08
176	21.76	34.13	4.66	**221**	23.35	36.81	1.28	**266**	16.32	28.99	1.72
177	21.77	34.54	2.07	**222**	23.30	36.47	1.58	**267**	15.88	28.92	1.54
178	21.14	34.90	1.84	**223**	23.29	36.56	2.82	**268**	15.46	29.13	0.99
179	21.92	34.93	2.61	**224**	22.78	36.93	1.29	**269**	14.88	28.85	2.31
180	22.43	35.30	2.62	**225**	22.71	36.49	2.05	**270**	15.21	27.18	0.26

Woodward Scenario B1											
day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)	day	min T[°C]	max T[°C]	rain(mm)
271	14.52	27.98	1.61	**316**	3.93	16.72	1.15	**361**	-2.47	10.65	0.69
272	14.52	28.25	1.79	**317**	4.96	17.53	1.46	**362**	-2.42	10.55	0.35
273	13.40	28.25	1.44	**318**	5.15	18.82	0.30	**363**	-2.47	11.25	0.53
274	13.10	27.09	1.02	**319**	4.04	18.24	0.39	**364**	-2.38	10.94	0.86
275	12.21	27.26	1.36	**320**	3.96	18.68	0.31	**365**	-2.62	10.93	0.95
276	12.97	27.49	1.50	**321**	3.33	18.00	0.09				
277	12.79	26.41	2.04	**322**	3.42	17.25	0.27				
278	12.47	26.63	1.27	**323**	2.96	16.92	0.80				
279	12.61	25.68	2.46	**324**	2.64	15.78	1.01				
280	12.92	25.99	1.69	**325**	2.94	16.31	1.89				
281	11.67	25.81	2.85	**326**	2.46	15.21	0.97				
282	12.17	24.74	0.88	**327**	2.05	15.18	0.89				
283	12.33	24.27	2.46	**328**	1.56	16.02	0.47				
284	12.19	24.61	3.74	**329**	1.84	16.31	0.54				
285	11.09	24.80	3.09	**330**	1.58	15.42	0.30				
286	10.89	24.66	1.34	**331**	1.71	14.15	0.79				
287	10.32	24.78	1.99	**332**	0.75	15.24	0.59				
288	10.40	24.46	2.51	**333**	1.28	13.45	0.58				
289	9.76	23.24	3.29	**334**	1.15	13.62	0.99				
290	9.93	23.45	3.17	**335**	-0.05	12.74	0.99				
291	10.36	23.73	1.15	**336**	-0.20	12.94	0.62				
292	9.54	22.63	2.73	**337**	-1.29	12.60	0.43				
293	8.83	22.96	1.85	**338**	-1.07	12.66	0.92				
294	8.90	22.99	3.04	**339**	-1.77	11.66	0.48				
295	9.19	22.94	0.80	**340**	-1.52	10.45	1.11				
296	9.23	22.73	1.24	**341**	-1.97	11.67	0.16				
297	9.35	22.16	1.16	**342**	-2.31	11.47	0.51				
298	8.55	21.24	1.65	**343**	-2.43	9.89	1.19				
299	8.01	20.92	2.82	**344**	-2.15	10.61	1.49				
300	8.03	21.34	1.79	**345**	-1.39	11.26	0.98				
301	7.57	21.30	0.42	**346**	-1.30	10.55	0.77				
302	7.10	21.54	2.14	**347**	-1.70	11.35	0.32				
303	6.81	20.98	1.13	**348**	-1.96	11.22	0.49				
304	7.33	21.14	3.02	**349**	-1.76	11.01	0.81				
305	6.20	20.68	0.43	**350**	-1.46	11.10	1.22				
306	7.33	21.52	1.90	**351**	-1.83	10.46	0.79				
307	6.67	20.58	0.77	**352**	-1.85	11.69	0.49				
308	6.11	20.71	0.44	**353**	-1.92	12.53	0.28				
309	6.40	19.28	1.15	**354**	-2.23	11.44	1.08				
310	6.21	18.63	1.38	**355**	-1.39	11.24	0.94				
311	5.99	19.78	0.47	**356**	-2.22	11.05	0.69				
312	5.16	19.33	1.17	**357**	-1.99	11.24	0.44				
313	5.06	19.11	2.49	**358**	-1.65	11.34	0.83				
314	4.48	19.33	0.90	**359**	-1.88	11.02	0.54				
315	4.39	18.47	1.09	**360**	-2.78	11.78	0.76				

IHACRES output:

Discharge under A1B scenario (cumec)												
year	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec
2046	0.9432	0.7877	1.1673	1.1807	2.7154	4.7927	2.1764	1.5181	1.1345	0.094	0.1181	0.5102
2047	1.0214	0.762	0.2799	1.1658	1.9819	3.6696	2.0489	0.8587	0.5309	1.09	6.2145	2.5281
2048	1.4935	0.8622	1.6898	2.5319	2.2944	1.7981	1.1097	0.4401	0.2787	0.7104	0.3172	0.3188
2049	0.9268	1.1373	1.0805	1.7156	0.7746	1.3527	1.725	1.0326	0.5389	0.6705	0.3673	0.7118
2050	1.3941	1.4363	0.5918	0.1218	0.0504	1.3609	1.7045	0.9395	0.8432	0.0251	0.5047	0.5795
2051	0.5367	0.4794	0.3048	0.1817	0.7759	2.5587	1.9484	0.7825	0.4465	0.6799	0.3582	0.2859
2052	0.6925	0.728	0.3622	0.4842	0.9121	0.7825	0.6369	0.9059	1.3051	6.6306	3.2297	3.1803
2053	2.1716	1.7555	0.8055	1.8783	0.8857	0.5472	0.5393	1.0031	1.2942	0.155	0.0497	1.0372
2054	1.3632	2.4809	3.8176	9.6842	6.2472	2.1844	0.9333	0.4578	0.5377	5.0579	3.2666	1.6272
2055	1.135	0.4902	0.3904	0.021	0.3331	0.3201	1.0267	1.0551	1.076	0.2959	0.1966	1.1243
2056	1.0202	1.1863	1.5987	0.6854	3.921	1.6144	1.1783	0.6392	0.7064	0.2218	0.0601	0.6746
2057	0.5794	1.3278	1.1128	1.304	1.7295	1.0171	0.7122	0.4949	1.053	8.4838	4.5405	1.783
2058	1.2916	1.0703	0.8475	0.4909	0.5809	0.8952	1.143	1.0723	1.0785	0.1069	0.4852	1.1292
2059	0.7483	0.842	2.1168	0.8027	1.7891	1.5309	1.0105	0.4529	1.0596	0.3915	0.2824	0.3207
2060	0.4479	0.328	0.7777	0.0123	0.0943	0.2692	2.247	1.3985	0.5939	0.6133	0.1463	0.4004
2061	0.6002	0.5736	2.9568	2.5797	2.4092	1.3452	0.7559	0.5196	0.8181	0.5165	0.061	0.6313
2062	1.0817	1.7255	1.1603	1.2319	0.6369	0.6878	0.9463	0.5269	0.4481	0.0892	1.0213	1.5341
2063	1.2718	1.0319	2.4412	2.5817	1.8681	0.7149	0.3729	0.3824	0.9045	3.9255	6.8682	3.7585
2064	2.7575	3.4396	2.8113	2.8119	2.7365	1.0324	0.5195	0.8761	1.0353	0.264	0.1018	0.4341
2065	1.8244	0.9735	0.3218	0.0401	0.1556	0.1289	0.3473	0.8068	0.9166	0.2518	0.4685	0.6133
2066	1.5667	0.9771	1.0418	0.2512	0.288	0.2929	1.0022	0.8645	0.9507	0.2589	0.7426	0.7276
2067	0.6592	0.5587	1.1806	1.0904	1.7995	1.2235	0.5779	0.3374	0.2958	0.6201	0.0487	0.8039
2068	0.7918	0.7602	1.6275	3.2278	3.8031	2.1932	1.0039	0.5767	0.4434	5.9299	4.0086	3.6294
2069	2.479	1.8326	0.7401	2.0299	1.5061	1.795	0.8804	0.4329	0.2835	0.3655	0.2658	0.4076
2070	2.5525	1.8105	0.7586	2.0803	1.5335	1.8201	0.9153	0.4414	0.2881	0.4277	0.2601	0.3969
2071	0.6227	0.5652	0.3306	0.0616	0.6015	1.0248	1.1697	1.2043	2.751	0.8757	0.4559	1.7206
2072	1.2085	1.136	1.2092	1.5342	1.6323	1.38	1.0656	0.7414	0.8014	0.1291	0.2006	1.1478
2073	0.5479	0.428	0.8777	0.1123	0.1943	0.3692	2.347	1.4985	0.6939	0.5133	0.0463	0.5004
2074	0.7479	0.628	1.0777	0.3123	0.3943	0.5692	2.547	1.6985	0.8939	0.3133	0.1537	0.7004
2075	2.0244	1.1735	0.5218	0.1599	0.3556	0.3289	0.5473	1.0068	1.1166	0.0518	0.6685	0.8133

Discharge under A2 scenario (cumec)												
year	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec
2046	0.9509	0.9933	0.9472	0.8744	0.6969	0.766	0.937	1.0628	1.3034	0.945	1.4277	1.4402
2047	0.7218	0.8344	1.4494	1.7133	2.8131	4.4244	1.7104	1.2245	0.9673	0.4305	0.4975	0.2583
2048	0.8307	0.8112	0.5325	1.8173	2.2314	3.211	1.4657	0.5082	0.3291	5.2053	5.9822	2.0834
2049	1.219	0.8613	1.9055	3.1775	2.5208	1.5924	0.7078	0.1235	0.0793	0.3497	0.1015	0.0836
2050	1.0465	1.1671	1.2307	1.1023	0.7659	0.6597	0.5184	0.5126	0.6481	0.264	0.7542	0.8055
2051	1.2892	1.5784	0.8799	0.4693	0.3352	1.1274	1.1208	0.5667	0.639	0.3478	0.8338	0.3173
2052	0.2942	0.4864	0.5398	0.7744	1.0133	2.1415	1.3326	0.4117	0.2335	0.3194	0.0651	0.0484
2053	0.4913	0.7938	0.6295	1.0895	1.2317	0.7336	0.2832	0.6583	1.1487	6.3192	3.311	2.8392
2054	1.2177	1.2258	1.3041	1.5116	2.0017	2.3683	2.3549	2.3964	2.4966	2.0258	2.8656	3.084
2055	1.18	2.6667	4.2526	10.745	6.1431	2.0456	0.5597	0.1581	0.3498	5.0107	3.2629	1.2459
2056	0.8839	0.4968	0.622	0.5638	0.5825	0.3118	0.6784	0.8024	0.9338	0.0671	0.5806	0.8815
2057	0.8066	1.2267	1.8846	1.2903	4.6018	1.7055	0.8794	0.3495	0.5087	0.1106	0.3386	0.426
2058	1.9507	2.046	2.0007	1.7202	1.1532	0.7567	0.4756	0.3837	0.4883	0.1106	0.5771	0.566
2059	0.7272	0.8391	0.9614	0.9767	0.8515	0.807	0.6984	0.7877	0.9759	0.5137	0.874	0.8248
2060	0.9723	0.9777	0.9171	0.7997	0.6874	0.6544	0.4743	0.5117	0.702	0.307	0.7342	0.7208
2061	0.8799	0.95	0.9662	0.8244	0.5802	0.6279	0.5711	0.4943	0.5514	0.1065	0.5446	0.538
2062	0.6915	0.7938	0.8428	0.7731	0.5825	0.4545	0.2588	0.2475	0.4418	0.1158	0.5639	0.5536
2063	0.7146	0.7642	0.7641	0.6506	0.4532	0.6108	0.5749	0.6155	0.7168	0.2383	0.6701	0.6664
2064	0.8298	0.8978	0.96	0.935	0.8098	0.5383	0.2897	0.2647	0.4397	0.1181	0.6111	0.7291
2065	0.9713	1.0792	1.1151	1.1049	1.1003	1.428	1.4448	1.5071	1.6413	1.1412	1.5765	1.4538
2066	1.5687	1.6872	1.6873	1.5296	1.4531	1.2628	1.1236	1.1549	1.3208	0.9701	1.3576	1.3573
2067	1.5898	1.6628	1.7424	1.6299	1.7178	1.7189	1.5307	1.507	1.636	1.178	1.5863	1.5908
2068	1.6745	1.7229	1.7412	1.7017	1.0153	0.8826	0.734	0.7896	0.9696	0.5874	1.3216	1.3732
2069	1.5641	1.6245	1.6129	1.4372	1.1763	0.9781	0.76	0.7337	0.8796	0.4546	0.5769	0.4465
2070	0.5311	0.5944	0.6923	0.6366	0.5837	0.6147	0.5169	0.5426	0.6787	0.28	0.7158	0.7035
2071	0.8594	0.9142	0.9364	0.9977	0.7947	0.6812	0.5126	0.4914	0.6234	0.1944	0.6246	0.6005
2072	0.7771	0.8589	0.8271	0.6948	0.5147	0.5086	0.3731	0.4136	0.7536	0.4338	0.8915	0.9056
2073	1.0986	0.8589	1.3038	1.1701	0.951	0.9146	0.7903	0.7691	0.7683	0.3054	0.7261	0.6917
2074	0.5387	0.8589	1.4346	1.0442	1.2189	0.6403	0.0678	0.4058	0.5474	0.15	0.1216	0.2552
2075	0.7387	1.0589	1.6346	1.2442	1.4189	0.8403	0.2678	0.6058	0.7474	0.05	0.3216	0.4552

Discharge under B1 scenario (cumec)												
year	jan	feb	mar	ap	may	jun	jul	aug	sep	oct	nov	dec
2046	0.0726	0.0567	0.2867	2.2361	2.2374	1.2457	0.3316	0.1707	0.0118	0.0071	0.0163	0.3145
2047	0.6952	0.7626	0.4831	0.0386	0.2101	0.8117	1.1498	0.8876	1.1823	1.2793	0.8666	1.6098
2048	0.4284	0.552	0.9926	1.0069	2.8085	5.8059	2.2293	1.1782	0.6898	0.5768	0.008	0.1912
2049	0.4884	0.4943	0.0136	1.1157	2.151	4.303	2.0664	0.5113	0.13	5.1097	5.3406	2.0078
2050	0.8944	0.5653	1.4481	2.049	2.5559	2.0918	0.9576	0.0605	0.0361	0.0102	0.1031	0.0181
2051	0.8119	0.9589	0.788	0.2834	0.2743	0.6733	0.5966	0.459	0.5196	0.539	0.3296	0.8101
2052	0.9806	1.2744	0.351	0.0219	0.0104	1.4354	1.4933	0.5459	0.3759	0.4694	0.2999	0.2425
2053	0.0179	0.1879	0.0093	0.3788	0.6674	2.721	1.7848	0.3964	0.0399	0.1774	0.0693	0.1855
2054	0.1129	0.4857	0.0988	0.3121	0.9174	0.8962	0.4187	0.4603	0.7688	5.9203	1.699	2.6506
2055	0.9409	0.9727	0.819	0.6746	1.443	2.5503	2.6258	2.5298	2.4043	2.5008	2.6424	3.2891
2056	0.8992	2.4393	3.968	10.814	6.6153	2.4237	0.7271	0.0527	0.0926	5.0448	2.5359	1.1868
2057	0.5596	0.195	0.1007	0.1454	0.1517	0.351	0.8301	0.6246	0.6115	0.2099	0.0865	0.8707
2058	0.5045	0.9607	1.4243	0.5169	5.1948	2.1329	1.0941	0.2887	0.2425	0.2543	0.0089	0.3799
2059	1.8579	1.9753	1.6912	0.1256	0.7451	0.7916	0.5387	0.2807	0.2963	0.3164	0.0819	0.5009
2060	0.4027	0.5359	0.419	0.0616	0.2862	0.7511	0.7184	0.6712	0.7821	0.7399	0.4191	0.8061
2061	0.6968	0.7298	0.4368	0.0785	0.1933	0.6708	0.5416	0.4399	0.549	0.5613	0.2955	0.7147
2062	0.6159	0.7099	0.4911	0.1004	0.064	0.6508	0.6853	0.461	0.4405	0.4056	0.1507	0.5761
2063	0.4702	0.5954	0.4075	0.0923	0.1128	0.4726	0.3252	0.1629	0.2655	0.3333	0.0834	0.5042
2064	0.4065	0.4206	0.2456	0.0161	0.1018	0.6174	0.6701	0.5749	0.6068	0.5471	0.2872	0.7162
2065	0.6214	0.6531	0.5392	0.1433	0.368	0.5531	0.343	0.1664	0.2527	0.3209	0.1161	0.6742
2066	0.6643	0.7985	0.6011	0.0145	0.5931	1.5327	1.6615	1.5948	1.6588	1.5857	0.933	1.6343
2067	1.4848	1.6246	1.3866	0.8457	0.926	1.4047	1.336	1.2334	1.3181	1.364	1.0559	1.492
2068	1.4763	1.5786	1.425	0.7656	1.4201	1.9405	1.7996	1.6199	1.6668	1.6251	1.343	1.781
2069	1.5994	1.6679	1.4494	0.9077	0.6114	0.9768	0.8878	0.8086	0.9086	0.931	0.9624	1.4383
2070	1.3682	1.4505	1.2017	0.6433	0.719	0.99	0.8146	0.6285	0.6876	0.6707	0.108	0.4137
2071	0.2386	0.3261	0.1881	0.0976	0.0652	0.6196	0.5964	0.4857	0.5472	0.5551	0.2972	0.7167
2072	0.6135	0.6917	0.4806	0.1778	0.3109	0.6913	0.5807	0.4104	0.4609	0.4424	0.1798	0.5868
2073	0.5065	0.6126	0.3428	0.005	0.0031	0.5197	0.4504	0.3495	0.5849	0.6597	0.42	0.8673
2074	0.8048	0.007	0.8019	0.2866	0.4092	0.8854	0.831	0.6647	0.601	0.5523	0.2818	0.6781
2075	0.24	0.007	0.9524	0.2412	0.9222	0.7794	0.1443	0.2186	0.2474	0.0144	0.0153	0.1973

APPENDIX C

Paper 1

IMPACTS OF CLIMATE CHANGE ON BEAVER RIVER FLOW IN WESTERN OKLAHOMA FROM 2016-2045

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December 2015

ABSTRACT

Development of technologies that use 85% of the world's fossil fuels and increasing demands and decreasing these resources have increased the production of CO_2 and thus climate change as well as rising global average temperature as 0.75° C, which causes natural disasters, such as droughts, floods and heat waves and can have negative impacts on the environment and economy.

So, review and assessment of climate change in future periods seems necessary for proper planning in the Beaver River catchment basin. In this study, using the output of HADCM3 general circulation models of the atmosphere under scenario A2, B1, A1B, hydraulic parameters, minimum and maximum temperatures will be forecasted for future period of 2016-2045 using LARS-WG model. Then using IHACRES hydrologic model, after calibration and verification of model, runoff from precipitation and temperature was obtained.

Keywords: climate change, downscaling, LARS-WG, Beaver River, IHACRES

INTRODUCTION

Climate is the average climatic conditions for a specific area and a specific period. Climate change refers to changes in climate behavior of a region to the expected behavior which is observed and recorded from information over a long time horizon (Karamouz and Araghynejad 2005). Climate change is the significant statistical change in mean climate state that lasts for a long period (for decades or longer). This change could be in the average temperature, precipitation, weather patterns, wind, radiation and similar parameters.

The climate may be warmer or colder and annual values of precipitation may increase or decrease (Khalili, 2000). In general, the gradual rise in global and oceans temperatures, due to increase in greenhouse gases, is the most important factor in climate change. Global warming of the earth causes two important phenomenon in the last hundred years; increase of average global temperature and consequently increase in sea level. Moreover, climate change has had significant impacts on precipitation, evaporation, surface runoff and thus hydrological extreme events at regional and local scale (Karamouz and Araqinejad, 2005).

Effect of greenhouse gases on climate fluctuations

Studies show that in the presence of greenhouse gases, a larger part of the solar energy will be kept in land and this will increase the global temperature. According to available evidences, over the past 100 years, the earth's temperature has increased by 0.3-0.6° C, that this increase is proportional to the increase in greenhouse gases in the atmosphere. However, climatologists consider other factors affecting global warming and believe that just the effect of greenhouse gases is not responsible for warming the planet. (IPCC, 2007)

Introduction to Intergovernmental Panel on Climate Change IPCC

Climate change is a very complex process, so politicians and decision-makers in different countries need strong and reliable sources of information to determine the causes of climate change and economic, social and environmental issues as well as ways to reduce its impact and adaptability to it. That is why the United Nations, the World Meteorological Organization (WMO) and the United Nations Environment Program (UNEP) have established IPCC in 1988. The main center of IPCC is located in Switzerland (Geneva).

IPCC has an international scientific structure. The body of the organization consists of government representatives, experts and ordinary people. IPCC has 3 working groups as follows:

Working Group I: The science of climate change

Working Group II: Impacts of climate change, adaptation and vulnerability

Working Group III: reducing the effects of climate change

Effect of climate change on water resources

One of the very important issues that have recently attracted the attention of many researchers and managers of the water resources is the effects of climate change on water resources management. In the past (before 1990), the planning and management of water resources was based on the assumption that climatic conditions are the same in the past, present and future. While, it is now clear that climate condition is rapidly changing due to the growing trend of development and human activities such as the release of greenhouse gases into the atmosphere, destroying forests, agricultural development and so on. Therefore, it is necessary to consider the effect of these changes on the planning and management of water resources and managers should consider more serious approaches to engineering design criteria, operating rules and water allocation policies (Werritty, 2002). Studies show that the importance of climate change in developing countries where the population growth rate is higher and adaptation to climate change is less, is essential. (IPCC, 2007)

By implementation of atmospheric general circulation models (GCM's) and using approaches to produce climate data in different regions, it could be argued that higher temperatures lead to stronger water cycle. This shows the chance of increasing the occurrence of severe droughts or floods in some regions and reducing them in other regions. General circulation models often show an increase in the intensity of rain as a result of climate change. The result of this type of models, the intensification of heavy precipitation is such that runoff and flooding is increased and water infiltration capacity is reduced. Hydrological changes on the earth's surface also affects the groundwater discharge (in a relatively long time), that is, practically, the entire aquifer. These changes, in turn, can be affected by the changes in amount and timing of rainfall caused by climate change. These changes are summarized in table 1. (IPCC, 1997)

LITRATURE REVIEW

Intergovernmental Panel on Climate Change was established by the World Meteorological Organization and the United Nations Environment program in 1988. The main mission of the IPCC was to assess the risks of climate change.

Since 1990 to 2007, IPCC has published four series of assessment reports on climate change which are almost cited in all publications, conferences and seminars related to climate change.

Cohen (1986) has examined the problems of scenarios of temperature and precipitation in general climate models for changes in water levels of the Great Lakes of North America. As a result, it was predicted that the storage of pure water of the Great Lakes will be reduced in response to scientific changes. Although, these results were sensitive to changes in wind speed and other assumptions related to variables affecting the rate of lake evaporation, but with the use of temperature and precipitation in 2 global climate models called GISS and GFDL, it represents a 15 to 30% reduction in pure water storage of basin. Bultot et al., (1988) have studied the effect of doubling the concentration of carbon dioxide on hydrological factors such as potential evapotranspiration, soil moisture, snow pile, groundwater storages, runoff and water balance in Belgium in 3 catchment basins. The results of these studies were compared in normal mode for a period of 70 years and generally concluded that potential evapotranspiration will be increased and soil moisture reduced. The underground water reserves in basins with high permeability will be increased otherwise will be decreased. Also, in basins with low soil permeability, the amount of flooding will be increased in winter. Also, Mitchell (1989) has compared the studies of 5 different institutions. He conducted studies on the relationship between a doubling of CO2 and its effect on temperature and precipitation. As shown in Table 2, temperatures were predicted between 5.2 to 2.8° C and precipitation between 7 to 18%.

In 2001, Kamga studied the impact of increasing greenhouse gases and climate change on Upper Benue River runoff in Cameroon where hydroelectric power is an important source of power generation to predict the discharge of the river. For this purpose, the monthly flow of river was estimated using a hydrological model of water level balance and the future course of climate change was simulated based on the ability of the model to reproduce the river current flow using HadCM2, ECHAM4 and OPYC3 models and concluded that due to the chosen scenario, an increase in temperature and precipitation in the region is expected. Jones et al., (2006) conducted a study on the sensitivity of annual average runoff in this area to climate change using SIMHYD and AWBM hydrological models in Australia catchment basins and found that the above models show the average changes of 2.1%, 2.5% and 2.4% to 1% change in the average precipitation.

Tripathi et al., (2006) provided a method based on the use of statistical machine learning methods (SVM) and the results of GCM to downscale the climate information and modeling of rainfall in a monthly time scale. At first, information of second-generation models of SGCM-2 was prepared in an area that includes regional studies, and then was applied for future estimations. The used information was collected in 36 points of NCEP database that includes temperature and pressure at different height levels, particularly relative humidity and wind speed factors. To evaluate their models, they used feed forward neural networks and ultimately SVM method was considered to be more efficient. Maurer et al., (2007), used the statistical methods for downscaling the outputs of 16 general circulation models under two scenarios A2 and B2 to evaluate the effects of climate change on water inlet of two large hydroelectric reservoirs in the Rio Lampa catchment basin in Central America. They then introduced the downscaled values of temperature and precipitation as VIC hydrological model. The results showed that under both scenarios, up to the end of the century, average temperature and average rainfall will be decreased. Accordingly, they concluded that the entrance to the reservoir and consequently, the hydroelectric production capacity of reservoirs will also decline. Noora et al., (2010) in their study, assessed the impact of climate change on flooding in Finland. To this end, they used the average output of 19 general circulation climate models (GCM) under 3 emission scenarios B1, A2 and A1B and 4 local climate models (RCM) with A1B emission scenarios. All climatic scenarios were used for the period of 2010-2039 and 2070-2099 and observation period 1971-2000. The results show the annual temperature increase between 1.8 and 5.4 C for 2070-2099 and increased precipitation between 8% and 22%. Finally, WSFS hydrological model was used to study the effects of climate change on flooding that in this model, daily precipitation and temperature obtained from climate models were entered as inputs to the model. They concluded that the floods with a return period of 100 years had an average reduction of 8 to 22% in the period 2070-2099 compared to the reference period.

INTRODUCTION TO BASIN

The Beaver River is a famous name for an irregular river in Oklahoma and it is located in most of the Oklahoma Panhandle. Also it is identified as the North Canadian River; both names are commonly used. The Beaver River come into Oklahoma from New Mexico as the North Canadian River, then assumes an alias at the Oklahoma boundary all the way to Fort Supply, where it again becomes identified as the North Canadian River It moves among Cimarron, Texas, Beaver, Harper and Woodward Counties in the Oklahoma Panhandle east of New Mexico and North of the Texas Panhandle, dropping shortly into Texas northeast of Stratford, the back into klahoma where it is linked by the Goff River in the northwest of Guymon from which it flows east to Optima Lake, formed by a dam on the river southeast of the Town of Optima. At the Beaver Town it flows through Beaver State Park. The Kiowa River flows into the Beaver northwest of Laverne, after that turns southeast to Fort Supply, where it becomes the North Canadian River again. Figure 1- shows the Beaver-North Canadian River Catchment basin and Location of Ogallala Aquifer in Oklahoma panhandle

In order to study the effect of climate change in the catchment basin of Beaver River following stations were selected.

Meteorological Stations:

- Boise city, Goodwell, Hooker, Beaver, and Woodward (refer to table 3)

Hydrometric Stations:

Beaver River near Guymon, Coldwater Creek near Hardesty, Palo Duro Creek at Range, Beaver River at Beaver, Clear Creek near Elmwood, Wolf Creek near Fargo, North Canadian River at Woodward, North Canadian River near Seiling (refer to table 4)

METHODOLOGY

In this paper, the following steps for studying the effect of climate change and also hydrological model was taken.

Mann-Kendall TEST

In order to find the trend of monthly and yearly climate change in the meteorological stations Mann-Kendall test was utilized. Rainfall and temperature data was gathered from NCDC[18] website during 1985 to 2015. The test is used for random checking of data (lack of process) in contrast to presence of trends in hydrological and meteorological time series (Zhang et al., 2005).

MODEL LARS-WG [(13), (14)]

In the next step, by using output of the general circulation medal HADCM3 under A2, B1, and A1B scenarios, future temperature and precipitation for 2016-2045 was predicted. LARS-WG is one of the most popular models of weather random data generator. This model uses the daily observational data at a specific site to calculate a class of possible distribution parameters of climatic variables, as well as the correlation between them. This category of parameters is used to build a synthetic time series of climate variables. By setting the obtained distribution parameters, a daily climate scenario for the site is created based on projected climate changes obtained from regional or global climate models, that can be used to assess climate changes and generating information (Semenov & Stratonovic, 2010)

[18] National Climatic Data Center

MODEL IHACRES [15]

In this step results from LARS-WG model were used as input data for IHACRES to generate the future river flow. Application of IHACRES model is to help the hydrologist or water resource engineers to evaluate the dynamic relation between basin rainfall and streamflow. Three basic components of IHACRES are: Simulation, Calibration, Prediction and Validation. For estimating the Beaver River runoff, daily rainfall (mm) and temperature (degree Celsius) data as input variable for simulating, and observed daily discharge data (cubic meter per second) for calibration were used. For running this model, 5 years out of 30 years observed data for calibration and 1 year for validation was chosen. Furthermore, result of modeling river flow was assessed and ability of the model in simulating daily mean discharge was determined. And flow of the Beaver River in the future was projected.

FINDINGS

The results of using Mann-Kendall with 90% confidence are gathered in table 5 and table 6. This information was gathered from 1985 through 2015.

Mann-Kendall yearly rainfall results during 1985 to 2015 are showing decreasing trend in all stations except for Beaver that does not have any trend. Maximum temperature has an increasing trend in Goodwell, Hooker, and Boise city stations. Looking at the tables, also there is an increase in minimum temperature in Hooker and Woodward stations. Average temperature is increasing in Goodwell and Hooker during this period while no trend was found in other stations.

In the next step, LARS-WG under A2, B1 and A1B scenarios was used for predicting rain, maximum and minimum temperature in Beaver River for 2016-2045. The results of the prediction are summarized in Figure 2 to Figure 4.

Looking at Figure 2 following results were found:

- Goodwell station has an increasing trend in rain based on 3 scenarios for 2016-2045. Same thing occurred for Boise city. Also Woodward station will experience an increase in rainfall under all scenarios. But In Beaver and Hooker stations the trend for rainfall in decreasing except for A2 scenario.

- Highest increase in rainfall can be seen at Goodwell station under B1 scenario within with approximately 7.9%.

As per figure 3 and figure 4, in all the stations and under all scenarios the minimum and maximum temperature in the future is increasing.

In next step, for converting temperature and rainfall data to discharge, results from LARS-WG model are utilized as input data for IHACRES.

First daily rainfall (mm), temperature (degree Celsius) and observed daily discharge data (cumec)from past were given to the model then the model was calibrated, after that ability of the model in simulating daily mean discharge was determined then the IHACRES model projected the Beaver River flow for the future periods of 2016-2045.

Results from modeling the river flow with IHACRES model under 3 Scenario A2, A1B and B1 for future is given in figure 5.

According to the results from figure 5 it is concluded that discharge in Beaver River basin under A1B scenario will decrease until the year 2045 and this drop from January-June is more than June-December. Under A2 scenario reduction in stream flow is almost 50 percent.

Until the year 2045 reduction in discharge of Beaver River basin under B1 scenario is more than 50 percent.Temperature incline and precipitation decline are 2 important parameters that cause reduction in river flow in this period.

CONCLUSIONS

1. Mann-Kendall yearly rainfall results shows decreasing trend in all stations except for Beaver that does not have any trend. Average temperature is increasing in Goodwell and Hooker during this period while no trend was found in other stations. Yearly results of the test show reduction in discharge in hydrometric stations. And monthly results for streamflow show either decreasing or no trend in most stations.

2. Results from LARS-WG (weather generator model) under A1B, B1 and A2 demonstrate that rain distribution has changed in all stations under three scenarios for future periods 2016-2045.

3. Results from LARS-WG for the future period 2016-2045 shows an increasing trend for maximum and minimum temperature in all the stations and under all scenarios.

4. It is concluded that discharge in Beaver River basin under A2, A1B and B1 scenarios will decrease by nearly 50% until the year 2045. Temperature incline and precipitation decline are 2 important parameters that cause reduction in river flow in this period.

5. Also under all 3 scenarios the river flow in warm months especially July, August and September reaches its lowest amount. The reason for this possibly is increase in temperature and increase in snow melting before getting to warm months.

6. Based on the results from this study, climate change until 2045 will affect the discharge of the Beaver River and will change the runoff distribution in all the seasons.

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FIGURES

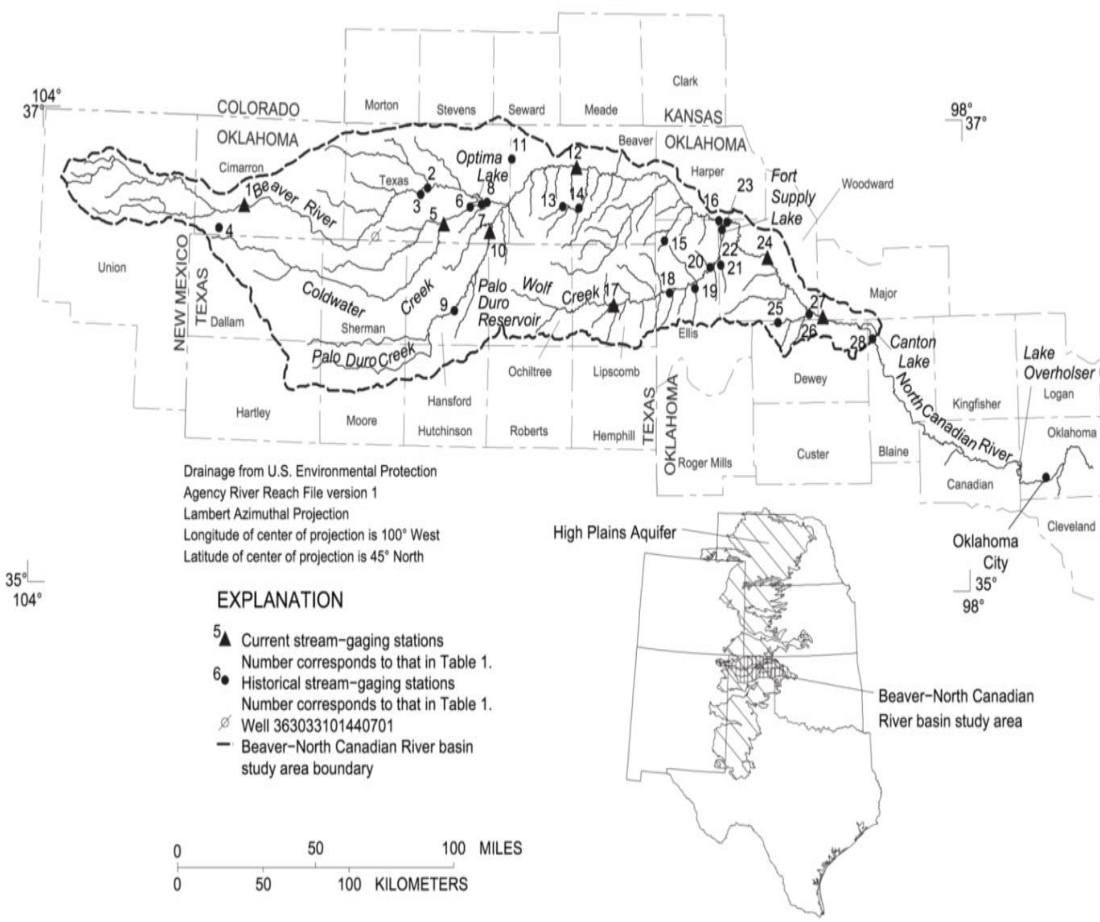

Figure 1- location of Beaver-North Canadian River Catchment basin and Ogallala Aquifer in Oklahoma panhandle

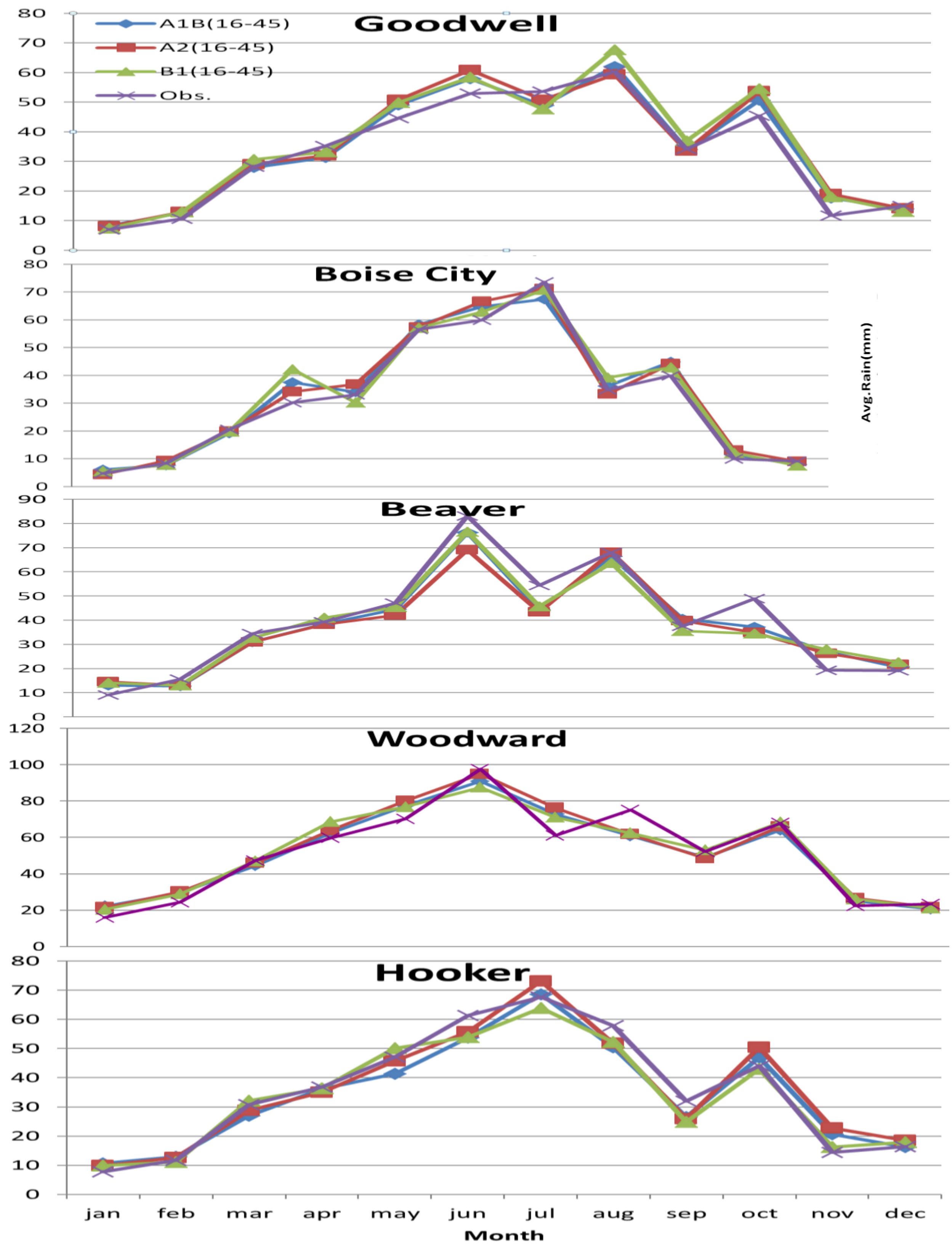

Figure 2- comparing observed rain with simulated rain from the model (mm)

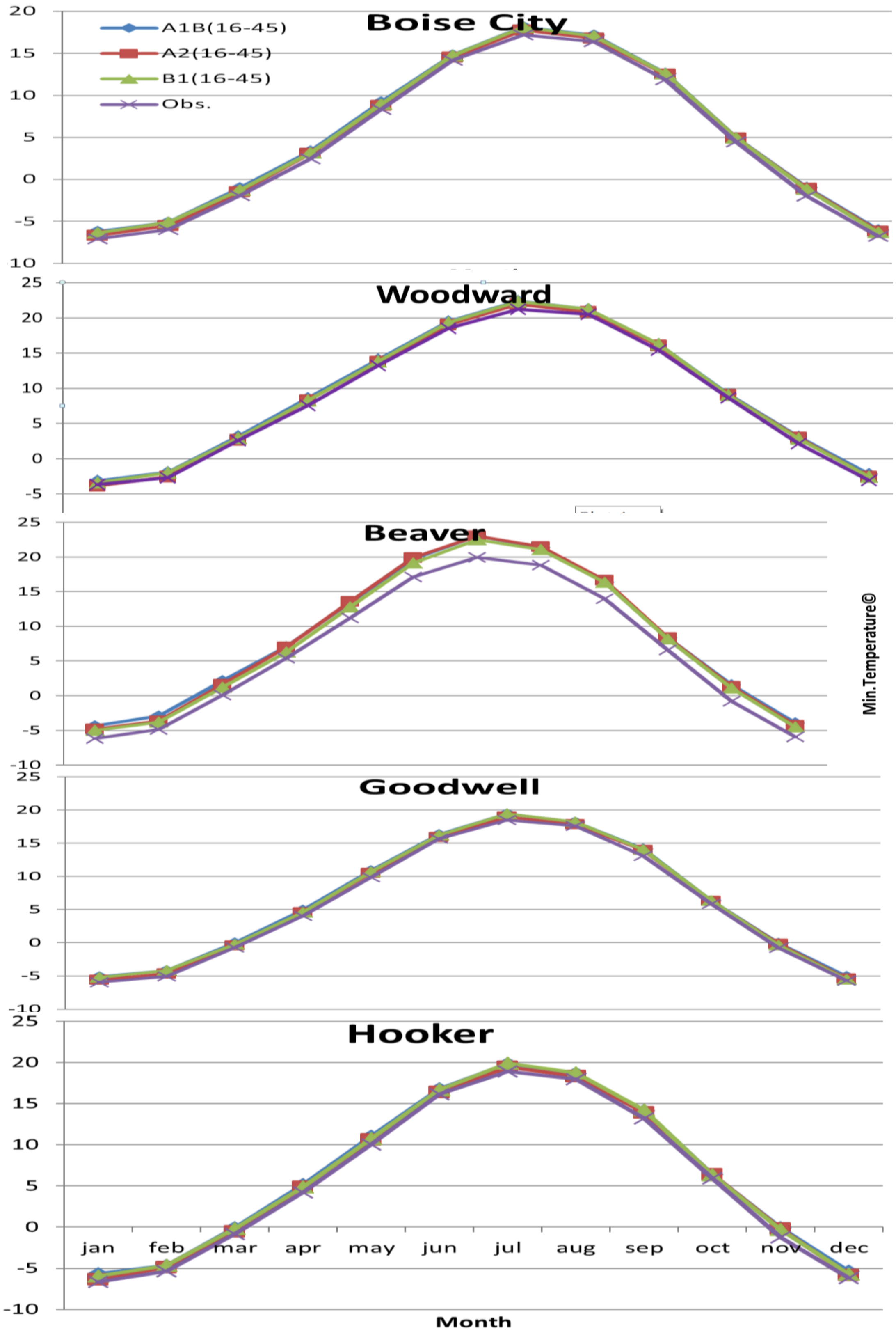

Figure 3- comparing observed and simulated Min. Temperature from the model [°C]

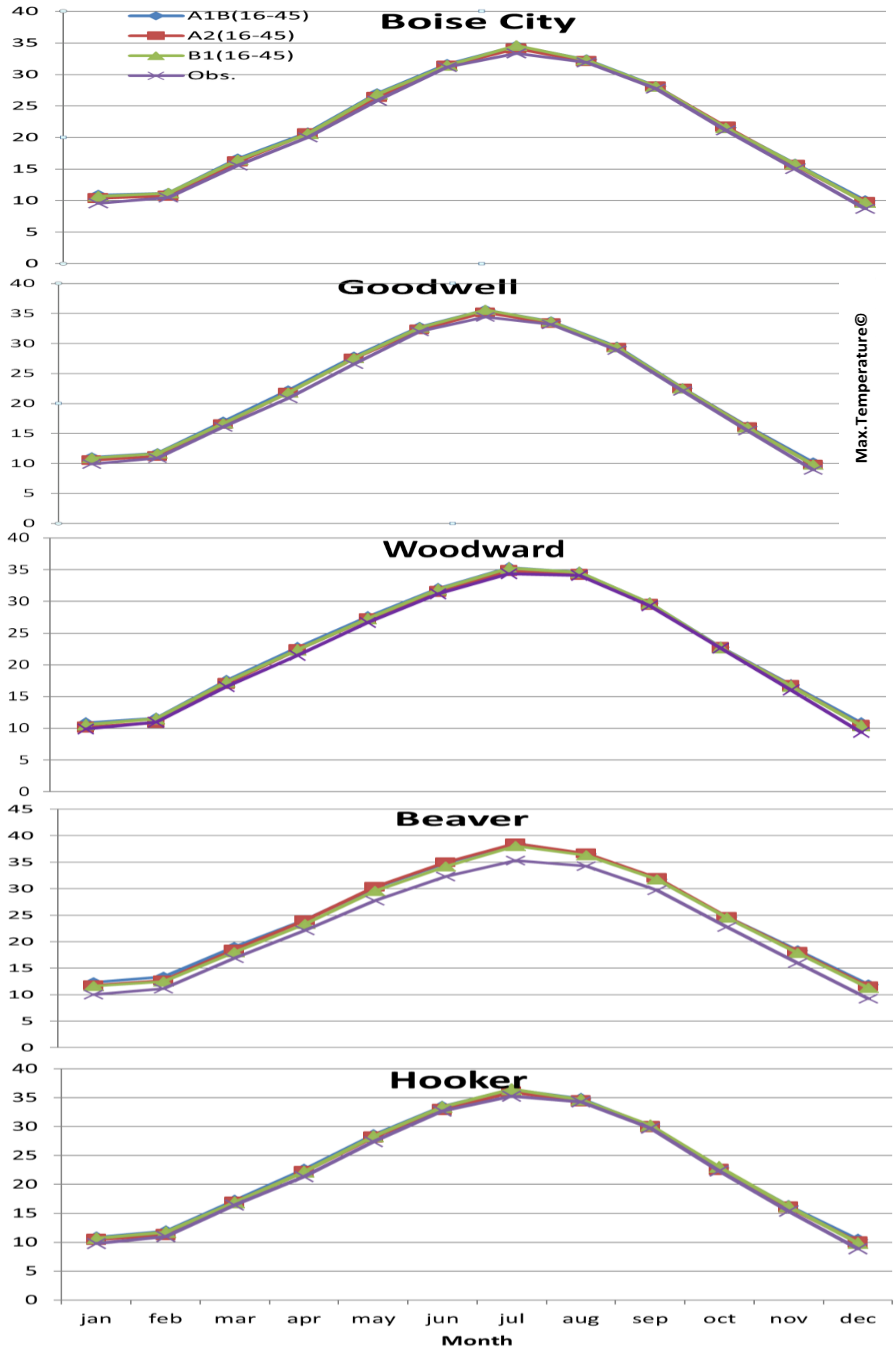

Figure 4- comparing observed and simulated Max. Temperature from the model [℃]

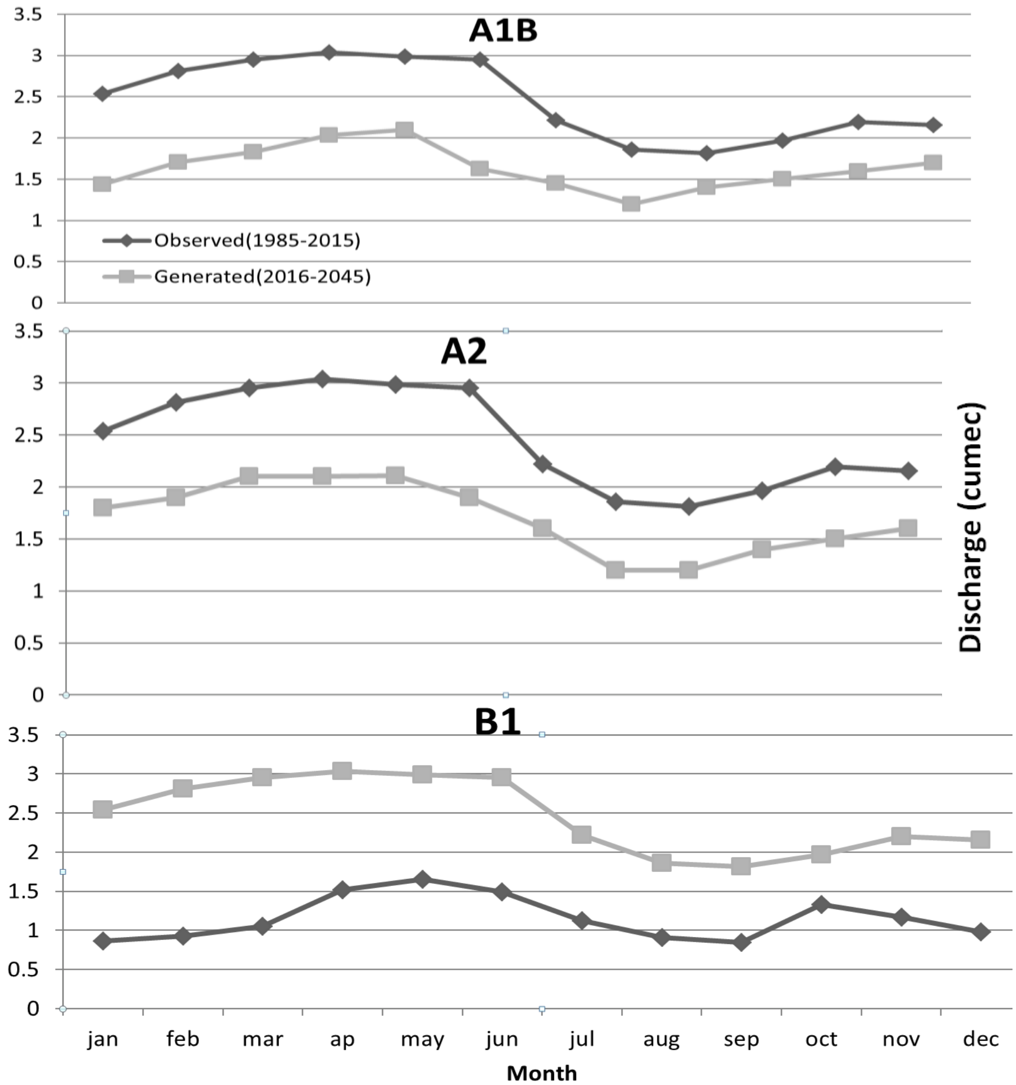

Figure 5-hydrographs with IHACRES model under A2, A1B and B1 scenarios (cumec)

TABLES

Table 1- effects of climate change on water resources (IPCC, 1997)

Factor	First Effect	Final Effect
CO_2 Increase	photosynthesis increase, turbidity increase	increase in consuming effective water
temperature increase	increase in plant grows, increase in evapotranspiration, increase in lakes and reservoir evaporation, runoff reduction and reducing groundwater feeding	changes in amount of available water, more water demand for agriculture, cleaning and cooling off
water surface increase	coastal lands reduction, salt infiltration to coastal aquifer, water move to estuarine and its effects on sweet water reservoirs	water quality reduction in coastal land, water quality reduction in groundwater
change in seasonal rain	changes in soil moisture, change in river discharge, change in the groundwater feeding	changes in water amount and quality in reservoirs
change in temperature and rainfall location	changes in basin quantitative hydrology (local changes)	changes in locations for water storage
changes in rainfall fluctuation (daily or less than annually)	changes in water amount between two rainfall, changes in peak discharge	more need for water supply storage
changes in drought risks	change in amount of seasonal water or seasonal water replacement	changes in water storage risks possibility
changes in flood risks	change in flood risk possibility, change in environmental impacts	change in water storage risks possibility , change in reservoirs excavation

Table 2- results of doubling CO_2 and its effect on temperature and precipitation (Mitchell, 1989)

study center	Maximum temperature effects ° C	Maximum changes in rainfall (%)
GISS	4.2	11
GFOL	4	8.7
NCAR[19]	4	7.1
MO[20]	5.2	15
OSU[21]	2.8	7

Table 3- coordinates of meteorological stations

Station name	Latitude	Longitude	Altitude
Boise City	36.69	-102.49	1267
Goodwell	36.6	-101.6	997
Hooker	36.85	-101.22	912
Beaver	36.8	-100.53	758
Woodward	36.42	-99.41	625

Table 4- coordinates of hydrometric stations

Station name	Latitude	Longitude	Drainage area
Beaver River near Guymon	36.72	101.48	5539.9 Square km
Coldwater Creek near Hardesty	36.64	101.21	5094.5 Square km
Palo Duro Creek at Range	36.54	101.08	3918.6 Square km
Beaver river at Beaver	36.82	100.51	20683.6 Square km
Clear Creek near Elmwood	36.64	100.5	440.2 Square km
Wolf Creek near Fargo	36.39	99.62	4206.1 Square km
North Canadian River at Woodward	36.43	99.27	30776.8 Square km
North Canadian River near Seiling	36.18	98.92	32517.3 Square km

[19] National Center for Atmospheric Research
[20] Meteorological Office
[21] Oregon State University

Table 5- Mann-Kendall test results for rainfall and temperature in meteorological stations

Beaver

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Rain	NT*	NT	NT	NT	-*	NT	NT	NT	-	+*	NT	NT	NT
Max,T	+	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Min,T	NT	NT	NT	NT	-	NT	NT	+	NT	NT	NT	NT	NT
Avg, T	NT	-	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT

Woodward

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Rain	-	NT	-	NT	-	NT	NT	NT	-	NT	NT	NT	-
Max,T	NT	-	+	NT	NT	+	NT	NT	NT	NT	NT	NT	NT
Min,T	-	+	NT	NT	NT	+	NT	NT	NT	NT	-	NT	+
Avg, T	NT	-	NT	NT	NT	+	NT	NT	NT	NT	NT	NT	NT

Goodwell

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Rain	NT	NT	NT	NT	-	NT	NT	NT	-	+	NT	NT	-
Max,T	NT	NT	+	+	+	-	NT	NT	NT	NT	+	NT	+
Min,T	NT	NT	NT	NT	NT	NT	-	-	NT	NT	NT	NT	NT
Avg, T	NT	NT	NT	NT	NT	-	-	-	NT	+	+	NT	+

Hooker

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Rain	NT	NT	NT	NT	-	NT	NT	NT	NT	NT	NT	NT	-
Max,T	NT	NT	NT	NT	+	NT	+	NT	+	NT	NT	NT	+
Min,T	NT	NT	NT	NT	NT	NT	NT	+	NT	NT	NT	NT	+
Avg, T	NT	NT	NT	NT	+	+	+	+	+	+	+	NT	+

Boise City

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Rain	NT	NT	NT	NT	-	+	NT	NT	NT	+	NT	NT	-
Max,T	NT	NT	NT	NT	+	+	+	+	+	NT	+	NT	+
Min,T	NT	NT	+	NT	-	NT	+	NT	NT	NT	NT	NT	NT
Avg, T	NT	NT	NT	NT	NT	+	NT	+	+	NT	NT	NT	NT

*NT is short form for ‘’No Trend’’, Minus and plus signs are for Decreasing and Increasing, respectively.

Table 6- Mann-Kendall test results for discharge in hydrometric stations

station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Beaver river at Beaver	-*	-	-	-	-	-	-	-	-	-	-	-	-
North Canadian River at Woodward	-	-	-	-	-	-	-	-	-	-	-	-	-
Wolf Creek near Fargo	NT*	-	NT	NT	-	-	-	NT	NT	NT	NT	NT	-
Clear Creek near Elmwood	-	-	-	NT	NT	NT	NT	NT	NT	-	-	-	-
Palo Duro Creek at Range	NT	-	-	NT	-	NT	NT	-	NT	NT	NT	NT	-
North Canadian River near Seiling	-	-	-	-	-	-	NT	NT	NT	-	-	-	-
Coldwater Creek near Hardesty	-	NT	NT	NT	-	NT	NT	NT	NT	NT	NT	NT	-
Beaver River near Guymon	-	-	-	-	-	-	-	-	-	-	-	-	-

*NT is short form for ‘’No Trend’’ , Minus and plus signs are for Decreasing and Increasing, respectively.

APPENDIX D

Paper 2

IMPACTS OF CLIMATE CHANGE ON BEAVER RIVER FLOW IN WESTERN OKLAHOMA FROM 2016-2075

ABSTRACT

Development of technologies that use 85% of the world's fossil fuels and increasing demands and decreasing these resources have increased the production of CO2 and thus climate change as well as rising global average temperature as 0.75° C, which causes natural disasters, such as droughts, floods and heat waves and can have negative impacts on the environment and economy.

So, review and assessment of climate change in future periods seems necessary for proper planning in the Beaver River catchment basin. Beaver River is located in northwestern Oklahoma, and continues to Canton Lake. In this study, using the output of HADCM3 general circulation models of the atmosphere under scenario A2, B1, A1B, hydraulic parameters, minimum and maximum temperatures will be forecasted in meteorological stations for future period of 2016-2045 and 2046 - 2075 using LARS-WG model. Then using IHACRES hydrologic model, after calibration and verification of model, runoff from precipitation and temperature for the next period of 2016-2045 and 2046 - 2075 was obtained in the hydrometric stations. The output of HADCM3 predicts the annual temperature and precipitation for future at the meteorological stations. The results show that climate change will affect the amount of annual runoff in hydrometric stations until the year 2075 and disrupts the runoff distribution during the months, so that the flow rate will be decreased.

Keywords: climate change, downscaling, LARS-WG, Beaver River, IHACRES

INTRODUCTION

Based on United States Environmental Protection Agency (EPA) Increases in average global temperatures are expected to be within the range of 0.3°C to 4.8°C by 2100. This will result in significant changes in water resources, energy demand, agricultural productivity and coastal areas. Changes in temperature pattern, reducing water resources, rising sea levels, destruction of coastal areas, loss of crops and food products, deforestation, drought frequency and resonance and direct threat to human health are the harmful effects of climate change. The indirect effects of climate change include economic damages caused by the developed countries countermeasures (NCCO, 2003).

Climatic scenarios in future periods

The variation in the concentration of greenhouse gases in the atmosphere over time disturbs the balance between earth's climate system components. But the amount of gas entering the system in the future and the scenario that will consequently occur for system is uncertain. So, it is presented as quite definite and under two different scenarios, which include non-climatic and climatic scenarios.

Non-climatic scenario

Several factors can lead to pollution and change in natural condition in the environment and affect the environment. Among which we can refer to society economic activities and subsequently, growth in industries and factories as well as changes in land use, leading to many contaminations and change in natural conditions in the environment. All of which increase concentrations of greenhouse gases. Therefore, it is necessary to examine the socioeconomic status of the earth in future periods. Generally, a non-climatic status contains information on the socio-economic situation and the amount of greenhouse gases emission in the earth's atmosphere, which is also called Emission Scenario.

Intergovernmental Panel on Climate Change is in charge of understanding all aspects of climate change and provided the initial set of emissions scenarios in 1992 called Scenari (IS92a-IS92f).

In this scenario, the amounts of greenhouse gases were increased at a fixed rate by 2100. In 1996, IPCC published a new series of emission scenarios to update and replace the IS92 scenarios called SRES[22]. In total, 40 different sub-scenarios SRES which includes a wide range of changes in the growth of the human population in future, economic and technological factors affecting on greenhouse gas emissions and particulate matter is provided. Each of the following scenarios is related to one of the A1, A2, B1 and B2 groups.

Climatic Scenario

According to what was said, scientists are greatly ensured to the increase in concentrations of atmospheric gases and thus increasing the average surface temperature of earth's atmosphere in future periods. But the changes in climatic variables on regional scale are not explicitly specified. Therefore, due to the difficulties in forecasting regional climate status under climate change is considered as an alternative to possible future climate conditions. But the remarkable thing is that the climate condition is not a predictor of the weather. (IPCC-TGCIA, 1999)

Currently, different methods for the production of climatic conditions in the coming period are being used which most elementary is production of synthetic scenarios in which climate variables increase or decrease arbitrarily (Williams et al., 1995, Semenov & Porter, 1988).

[22] Special Report on Emission Scenarios

Now, the most reliable tools to produce climate scenarios are coupled three-dimensional models of ocean – atmosphere, general circulation model (GCM) (Wilby & Harris, 2005).

Introduction to Intergovernmental Panel on Climate Change IPCC

Climate change is a very complex process, so politicians and decision-makers in different countries need strong and reliable sources of information to determine the causes of climate change and economic, social and environmental issues as well as ways to reduce its impact and adaptability to it. That is why the United Nations, the World Meteorological Organization (WMO) and the United Nations Environment Program (UNEP) have established IPCC in 1988. The main center of IPCC is located in Switzerland (Geneva).

IPCC has an international scientific structure. The body of the organization consists of government representatives, experts and ordinary people. IPCC has 3 working groups as follows:

Working Group I: The science of climate change

Working Group II: Impacts of climate change, adaptation and vulnerability

Working Group III: reducing the effects of climate change

General circulation models

Today, the study of the effects of greenhouse gases becomes a scientific and political issue. This leads to increasing pressure to provide different scenarios for recognizing the climate and factors affecting it. Climate scenarios don’t predict the future, but it can be defined that the climatic scenarios are a general picture of possible future for the climate.

General circulations models are three-dimensional ones which are developed based on different climate scenarios to simulate the effect of greenhouse gases on the earth's climate and are able to predict earth's future climate change (XU, 1999). The models were first introduced and applied in the 60s based on personal research of Phillips. General circulation models of the atmosphere solve continuum of fluid dynamics equations in atmosphere at discrete spatial and temporal scales. The structure of the models and numerical weather prediction models are identical.

General circulation models provide the best information on climate change due to greenhouse gas increase. These models are time dependent and have three-dimensional numerical simulations including atmospheric motions, heat exchanges and interactions of ice, ocean and land (Dracup & Vicuna, 2005)

LITRATURE REVIEW

In short, until 1985, when the report of Scientific Committee of environmental issues was published regarding the climate change, water resources were not yet entered the issue of climate change. But at this time, various questions in hydrological society were raised regarding the techniques of reviewing water resources affected by global warming caused by the buildup of greenhouse gases. And also which hydrological model is available to examine the effects of climate and which one is more appropriate for regional studies.

In 1985, the World Meteorological Organization has reviewed the effects of climate changes on water resources, which include special offers for testing and validation of different methods. The topic was continued in 1987 with a brief review of sensitivity of water resources systems to 2 issues: climate change in the future and current fluctuations. In the same year, the International Association of Hydrological sciences (IAHS) has dedicated a part of the twenty-first general plan of International Union of Geodesy and Geophysics (IUGG) to the climate and water resources and has published a series of articles on this topic.

Cohen (1986) has examined the problems of scenarios of temperature and precipitation in general climate models for changes in water levels of the Great Lakes of North America. As a result, it was predicted that the storage of pure water of the Great Lakes will be reduced in response to scientific changes. Although, these results were sensitive to changes in wind speed and other assumptions related to variables affecting the rate of lake evaporation, but with the use of temperature and precipitation in 2 global climate models called GISS and GFDL, it represents a 15 to 30% reduction in pure water storage of basin.

The efforts by Burger et al., (2007) on the effects of future climate change scenarios on runoff – precipitation modeling is another example of the efforts made in this field. Using regional climate change models, they simulated the Upper Gallego River discharge for A2 scenario in 2070-2100 with regard to future climate change.

Larson et al., (2008) estimated the cost of the risk of climate change in Alaska and their research duction more than 4 to 5 mm, especially in summer, and the only exception in this process, is an increase in winter rainfall in some northern basins of the Mediterranean, especially Alpine region. James et al., has shown that human-made systems in this area have left a lot of negative effects.

Giorgi and Lionello (2008), reviewed the climate change in the Mediterranean coastal area and came to the conclusion that in this area, the major impact of climate change, is drought and precipitation re (2009) have examined the systems of adaptability to climate change in Canada and concluded that the right economic and social policies in the region in the long run can have a positive impact on the climate change management in the current and future situations.

Maurer et al., (2007), used the statistical methods for downscaling the outputs of 16 general circulation models under two scenarios A2 and B2 to evaluate the effects of climate change on water inlet of two large hydroelectric reservoirs in the Rio Lampa catchment basin in Central America. They then introduced the downscaled values of temperature and precipitation as VIC hydrological model. The results showed that under both scenarios, up to the end of the century, average temperature and average rainfall will be decreased. Accordingly, they concluded that the entrance to the reservoir and consequently, the hydroelectric production capacity of reservoirs will also decline.

Fedderson and Anderson (2005) reduced the scale of monthly values of meteorological variables in North America. Information obtained by this method was controlled by using the ground station observations that collect data on a daily basis. Input information is derived from the results of general circulation models (GCM). These results are provided in 3 modeling steps including reducing spatial scale of data using SVD statistical methods, matching the data of the desired area and then estimation and comparison of the results using the daily information. They increased the accuracy of this method compared with the dynamic downscaling method. Schmidi (2006) studied the possibility of downscaling using the results of general circulation models of the atmosphere. They developed their method through the reanalyzed data of NCEP and ECMWF scenarios. This method also developed the daily estimation of monthly information.

WuDi et al., (2010) assessed and simulated climate change over 2011 - 2025 in 5 provinces in southwest China using RegCM3 simulation model and output of two general circulation model of the atmosphere - ocean ECHAM5 and taking into account the emission scenario SRES A1B. The results showed that temperature changes in North is more than South and min and max temperature change in winter is more than summer. Their research also showed that annual rainfall has increased while precipitation in summer and spring has been reduced.

INTRODUCTION TO BASIN

The Beaver River is a famous name for an irregular river in Oklahoma and it is located in most of the Oklahoma Panhandle. The Beaver-North Canadian River and its tributaries in western Oklahoma are primary sources of public-water supply. Ninety-two percent of the total withdrawals of surface water in the basin upstream of Oklahoma City are for public supply. Optima Lake on the Beaver River near Hardesty, Fort Supply Lake on Wolf Creek near Fort Supply, and Canton Lake on the North Canadian River near Canton provide storage of public-water supplies for western Oklahoma and for the Oklahoma City metropolitan area. Irrigation is the largest use of ground water in the Beaver-North Canadian River basin.

Ogallala Aquifer is the source of the river in this area. Because of that, and because of growing irrigation and other demands on the mentioned aquifer, the flow of the river in the Panhandle is shallow and irregular, and the Optima Lake has not too much water.

Figure 1- shows the Beaver-North Canadian River Catchment basin and Location of Ogallala Aquifer in Oklahoma panhandle

In order to study the effect of climate change in the catchment basin of Beaver River following stations were selected.

Meteorological Stations:

- Boise city, Goodwell, Hooker, Beaver, and Woodward (refer to table 1)

Hydrometric Stations:

- Beaver River near Guymon, Coldwater Creek near Hardesty, Palo Duro Creek at Range, Beaver River at Beaver, Clear Creek near Elmwood, Wolf Creek near Fargo, North Canadian River at Woodward, North Canadian River near Seiling (refer to table 2)

METHODOLOGY

In this paper, the following steps for studying the effect of climate change and also hydrological model was taken.

Mann-Kendall TEST

In order to find the trend of monthly and yearly climate change in the meteorological stations Mann-Kendall test was utilized. Rainfall and temperature data was gathered from NCDC[23] website during 1985 to 2015. The test is used for random checking of data (lack of process) in contrast to presence of trends in hydrological and meteorological time series (Zhang et al., 2005).

MODEL LARS-WG [(13), (14)]

In the next step, by using output of the general circulation medal HADCM3 under A2, B1, and A1B scenarios, future temperature and precipitation for 2016-2045 and 2046-2075 was predicted. LARS-WG is one of the most popular models of weather random data generator. This model uses the daily observational data at a specific site to calculate a class of possible distribution parameters of climatic variables, as well as the correlation between them. This category of parameters is used to build a synthetic time series of climate variables. By setting the obtained distribution parameters, a daily climate scenario for the site is created based on projected climate changes obtained from regional or global climate models, that can be used to assess climate changes and generating information (Semenov & Stratonovic, 2010)

[23] National Climatic Data Center

MODEL IHACRES [15]

In this step results from LARS-WG model were used as input data for IHACRES to generate the future river flow. Application of IHACRES model is to help the hydrologist or water resource engineers to evaluate the dynamic relation between basin rainfall and streamflow. Three basic components of IHACRES are: Simulation, Calibration, Prediction and Validation. For estimating the Beaver River runoff, daily rainfall (mm) and temperature (degree Celsius) data as input variable for simulating, and observed daily discharge data (cubic meter per second) for calibration were used. For running this model, 5 years out of 30 years observed data for calibration and 1 year for validation was chosen. Furthermore, result of modeling river flow was assessed and ability of the model in simulating daily mean discharge was determined. And flow of the Beaver River in the future was projected.

FINDINGS

The results of using Mann-Kendall with 90% confidence are gathered in table 3 and table 4. This information was gathered from 1985 through 2015.

Mann-Kendall yearly rainfall results during 1985 to 2015 are showing decreasing trend in all stations except for Beaver that does not have any trend. Maximum temperature has an increasing trend in Goodwell, Hooker, and Boise city stations. Looking at the tables, also there is an increase in minimum temperature in Hooker and Woodward stations. Average temperature is increasing in Goodwell and Hooker during this period while no trend was found in other stations.

In the next step, LARS-WG under A2, B1 and A1B scenarios was used for predicting rain, maximum and minimum temperature in Beaver River for 2016-2045 and 2046-2075. The results of the prediction are summarized in Figure 2 to Figure 4.

Looking at Figure 2 following results were found:

- Goodwell station has an increasing trend in rain based on 3 scenarios for 2016-2045 and 2046-2075. Same thing occurred for Boise city except for A2 and B1 scenarios in 2046-2075. Also Woodward station will experience an increase in rainfall under all scenarios excluding A2 scenario in 2046-2075. But In Beaver and Hooker stations the trend for rainfall in decreasing except for A2 scenario in 2016-2045.

- Highest increase in rainfall can be seen at Goodwell station under B1 scenario within 2016-2045 with approximately 7.9%.

- On the other hand, highest decrease in rainfall happened at Hooker station in connection with A2 scenario within 2046-2075 with 8.9% drop.

As per figure 3 and figure 4, in all the stations and under all scenarios the minimum and maximum temperature in the future is increasing.

In next step, for converting temperature and rainfall data to discharge, results from LARS-WG model are utilized as input data for IHACRES.

First daily rainfall (mm), temperature (degree Celsius) and observed daily discharge data (cumec)from past were given to the model then the model was calibrated, after that ability of the model in simulating daily mean discharge was determined then the IHACRES model projected the Beaver River flow for the future periods of 2016-45 and 2046-2075.

Results from modeling the river flow with IHACRES model under 3 Scenario A2, A1B and B1 for future is given in figure 5.

According to the results from figure 5 it is concluded that discharge in Beaver River basin under A1B scenario will decrease until the year 2045 and this drop from January-June is more than June-December. And until the year 2075 it drops again but with a less reduction rate. Under A2 scenario reduction in stream flow from 2016 until 2045 and from 2046 to 2075 is almost 50 percent. Until the year 2045 reduction in discharge of Beaver River basin under B1 scenario is more than 50 percent and from that year till 2075 does not have a significant decrease. Temperature incline and precipitation decline are 2 important parameters that cause reduction in river flow in this period.

CONCLUSIONS

1. Mann-Kendall yearly rainfall results shows decreasing trend in all stations except for Beaver that does not have any trend. Average temperature is increasing in Goodwell and Hooker during this period while no trend was found in other stations. Yearly results of the test show reduction in discharge in hydrometric stations. And monthly results for streamflow show either decreasing or no trend in most stations.

2. Results from LARS-WG (weather generator model) under A1B, B1 and A2 demonstrate that rain distribution has changed in all stations under three scenarios for future periods 2016-2045 and 2046-2075.

3. Results from LARS-WG for the future period 2016-2045 and 2046-2075 shows an increasing trend for maximum and minimum temperature in all the stations and under all scenarios. Highest increase in maximum temperature and minimum temperature is about 2.39 ℃ and 2.33 ℃ respectively.

4. It is concluded that discharge in Beaver River basin under A2, A1B and B1 scenarios will decrease by nearly 50% until the year 2075. Also reduction from 2015 to 2045 is more than 2046 to 2075. Temperature incline and precipitation decline are 2 important parameters that cause reduction in river flow in this period.

5. Also under all 3 scenarios the river flow in warm months especially July, August and September reaches its lowest amount. The reason for this possibly is increase in temperature and increase in snow melting before getting to warm months.

6. Based on the results from this study, climate change until 2075 will affect the discharge of the Beaver River and will change the runoff distribution in all the seasons.

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FIGURES

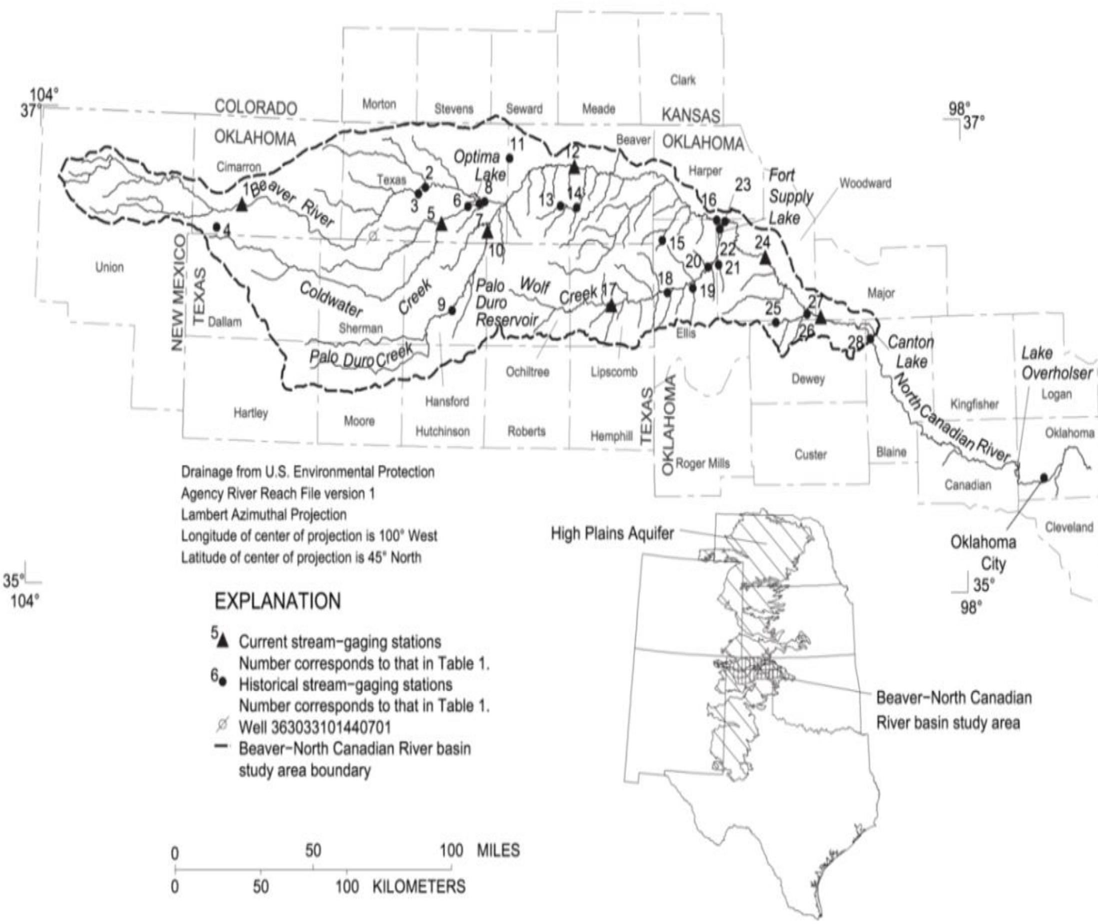

Figure 1- location of Beaver-North Canadian River Catchment basin and Ogallala Aquifer in Oklahoma panhandle

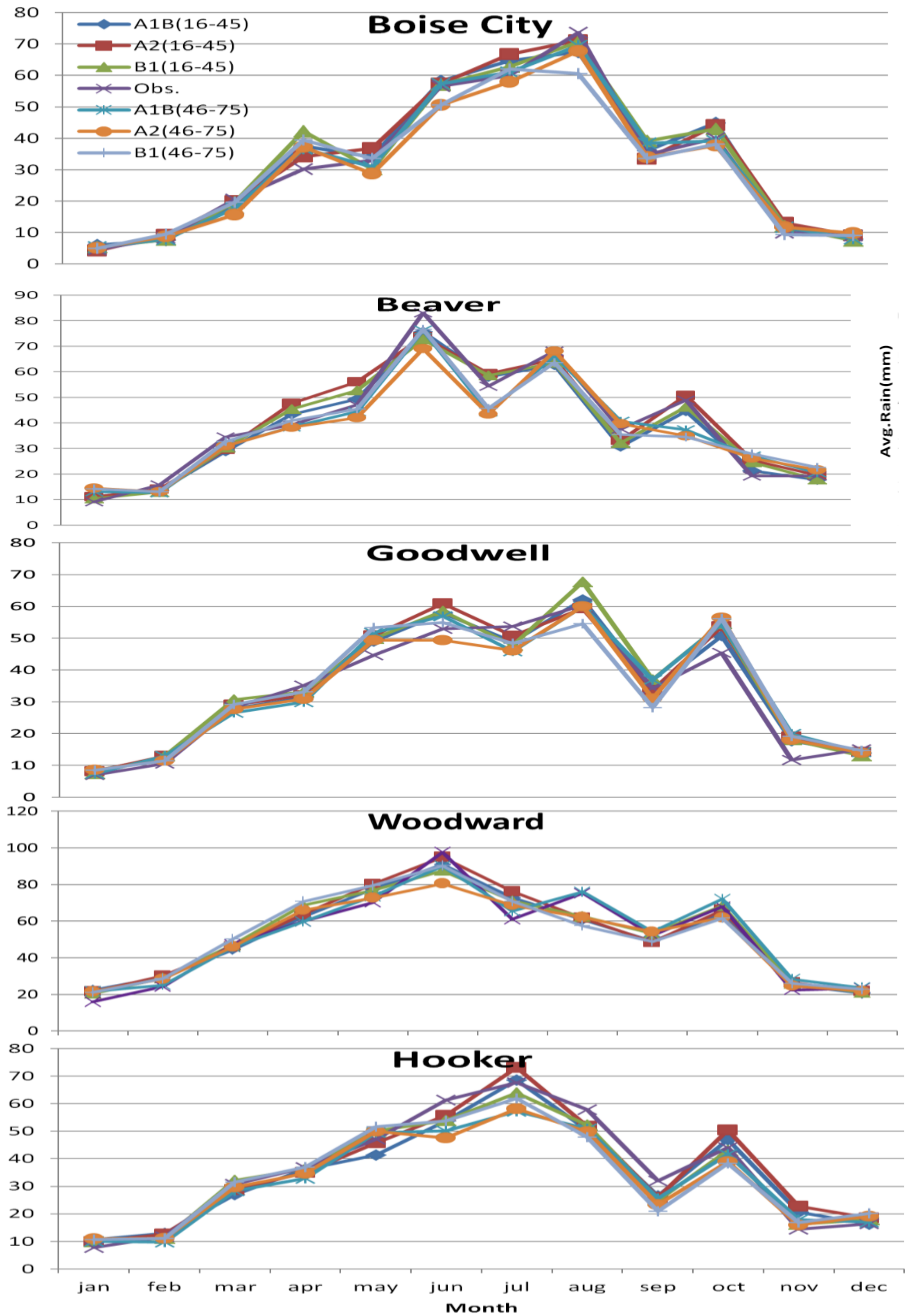

Figure 2- comparing observed rain with simulated rain from the model (mm)

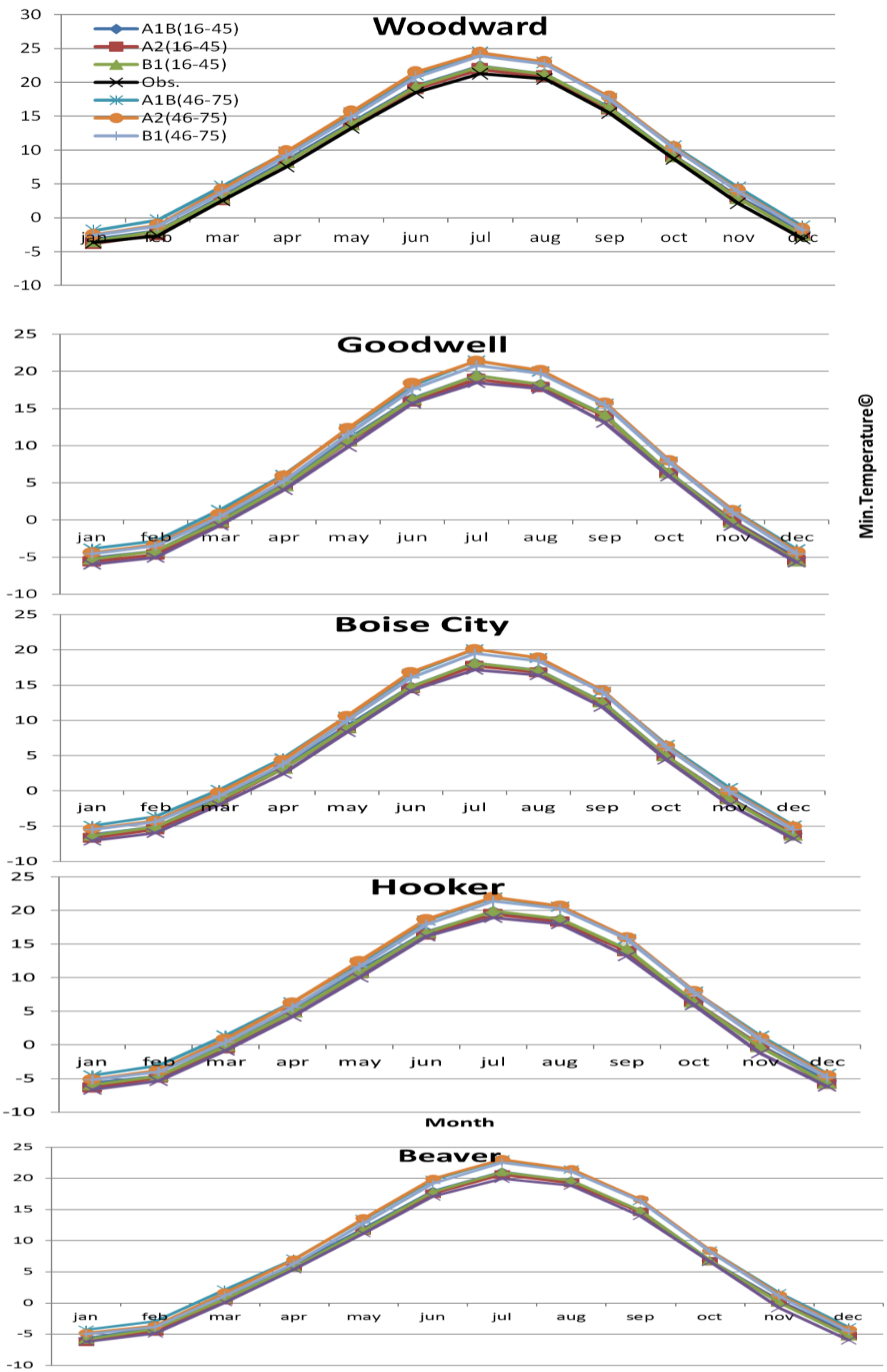

Figure 3- comparing observed and simulated Min. Temperature from the model [℃]

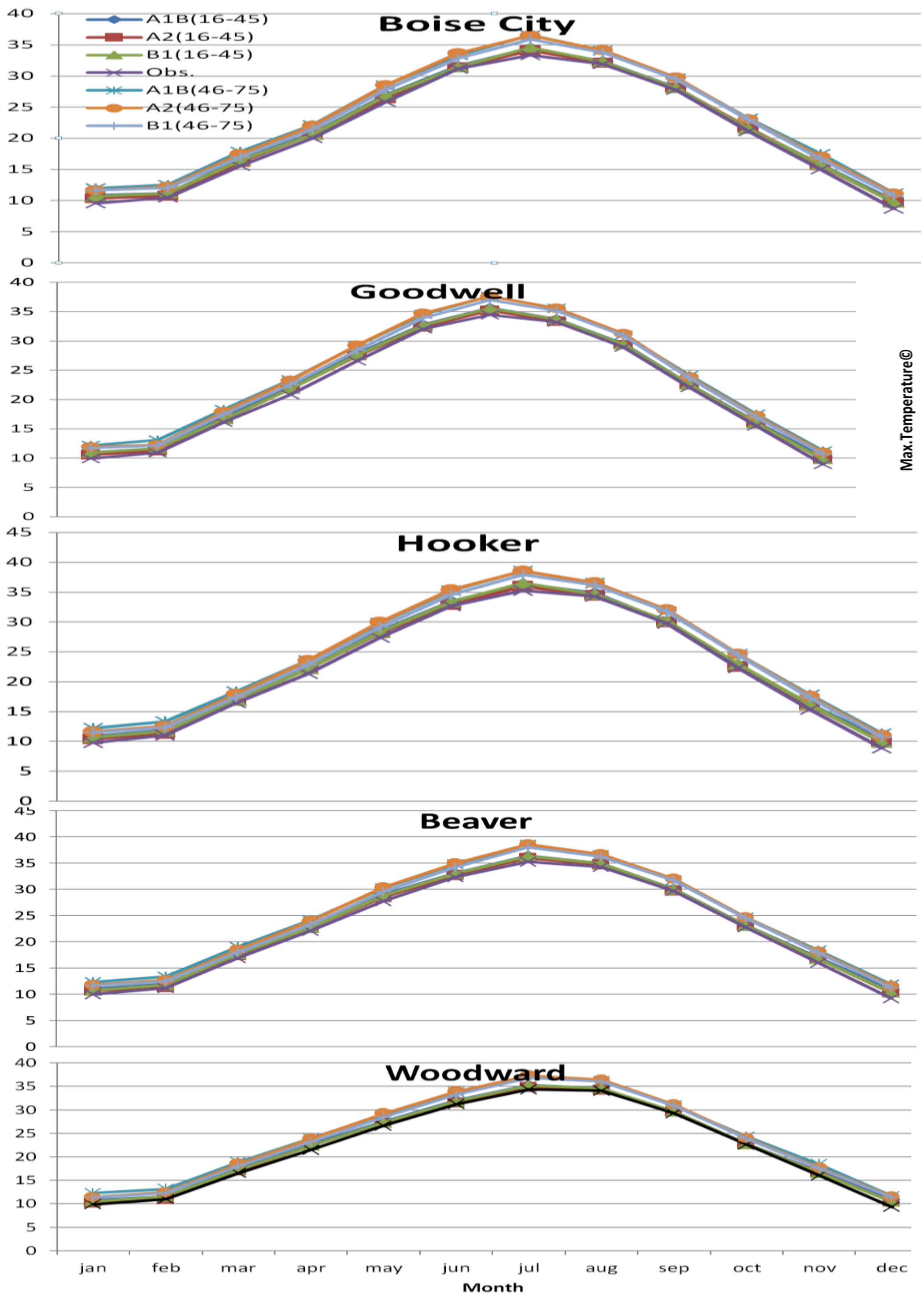

Figure 4- comparing observed and simulated Max. Temperature from the model [℃]

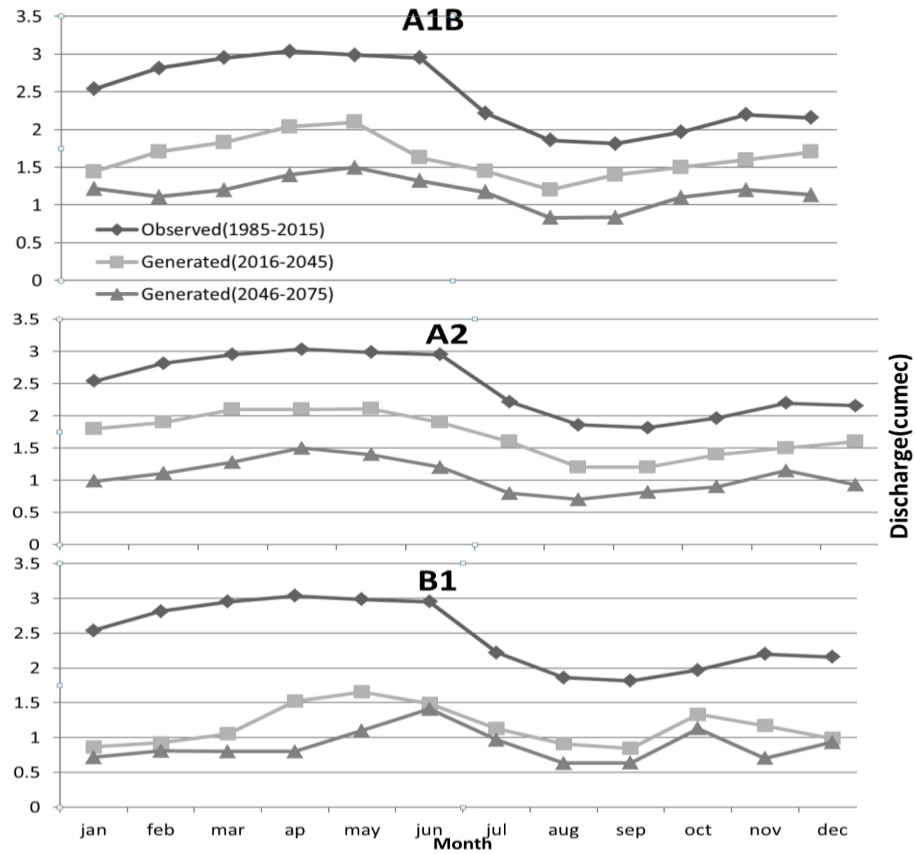

Figure 5-hydrographs with IHACRES model under A2, A1B and B1 scenarios (cumec)

Table 1- coordinates of meteorological stations

Station name	Latitude	Longitude	Altitude(m)
Boise City	36.69	-102.49	1267
Goodwell	36.6	-101.6	997
Hooker	36.85	-101.22	912
Beaver	36.8	-100.53	758
Woodward	36.42	-99.41	625

Table 2- coordinates of hydrometric stations

Station name	Latitude	Longitude	Drainage area
Beaver River near Guymon	36.72	101.48	5539.9 Square km
Coldwater Creek near Hardesty	36.64	101.21	5094.5 Square km
Palo Duro Creek at Range	36.54	101.08	3918.6 Square km
Beaver river at Beaver	36.82	100.51	20683.6 Square km
Clear Creek near Elmwood	36.64	100.5	440.2 Square km
Wolf Creek near Fargo	36.39	99.62	4206.1 Square km
North Canadian River at Woodward	36.43	99.27	30776.8 Square km
North Canadian River near Seiling	36.18	98.92	32517.3 Square km

Table 3- Mann-Kendall test results for rainfall and temperature in meteorological stations

						Beaver							
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Rain	NT*	NT	NT	NT	-*	NT	NT	NT	-	+*	NT	NT	NT
Max,T	+	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Min,T	NT	NT	NT	NT	-	NT	NT	+	NT	NT	NT	NT	NT
Avg, T	NT	-	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
						Woodward							
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Rain	-	NT	-	NT	-	NT	NT	NT	-	NT	NT	NT	-
Max,T	NT	-	+	NT	NT	+	NT	NT	NT	NT	NT	NT	NT
Min,T	-	+	NT	NT	NT	+	NT	NT	NT	NT	-	NT	+
Avg, T	NT	-	NT	NT	NT	+	NT	NT	NT	NT	NT	NT	NT
						Goodwell							
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Rain	NT	NT	NT	NT	-	NT	NT	NT	-	+	NT	NT	-
Max,T	NT	NT	+	+	+	-	NT	NT	NT	NT	+	NT	+
Min,T	NT	NT	NT	NT	NT	NT	-	-	NT	NT	NT	NT	NT
Avg, T	NT	NT	NT	NT	NT	-	-	-	NT	+	+	NT	+
						Hooker							
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Rain	NT	NT	NT	NT	-	NT	NT	NT	NT	NT	NT	NT	-
Max,T	NT	NT	NT	NT	+	NT	+	NT	+	NT	NT	NT	+
Min,T	NT	NT	NT	NT	NT	NT	NT	+	NT	NT	NT	NT	+
Avg, T	NT	NT	NT	NT	+	+	+	+	+	+	+	NT	+
						Boise City							
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Rain	NT	NT	NT	NT	-	+	NT	NT	NT	+	NT	NT	-
Max,T	NT	NT	NT	NT	+	+	+	+	+	NT	+	NT	+
Min,T	NT	NT	+	NT	-	NT	+	NT	NT	NT	NT	NT	NT
Avg, T	NT	NT	NT	NT	NT	+	NT	+	+	NT	NT	NT	NT

*NT is short form for ‘’No Trend’’, Minus and plus signs are for Decreasing and Increasing, respectively.

Table 4- Mann-Kendall test results for discharge in hydrometric stations

station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Beaver river at Beaver	-*	-	-	-	-	-	-	-	-	-	-	-	-
North Canadian River at Woodward	-	-	-	-	-	-	-	-	-	-	-	-	-
Wolf Creek near Fargo	NT*	-	NT	NT	-	-	-	NT	NT	NT	NT	NT	-
Clear Creek near Elmwood	-	-	-	NT	NT	NT	NT	NT	NT	-	-	-	-
Palo Duro Creek at Range	NT	-	-	NT	-	NT	NT	-	NT	NT	NT	NT	-
North Canadian River near Seiling	-	-	-	-	-	-	NT	NT	NT	-	-	-	-
Coldwater Creek near Hardesty	-	NT	NT	NT	-	NT	NT	NT	NT	NT	NT	NT	-
Beaver River near Guymon	-	-	-	-	-	-	-	-	-	-	-	-	-

*NT is short form for ‘’No Trend, Minus and plus signs are for Decreasing and Increasing, respectively.

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